日本古生物学會
報告・紀事

Transactions and Proceedings of the Palaeontological Society of Japan

New Series No. 26

日本古生物學會
Palaeontological Society of Japan
June 15, 1957

CONTENTS

TRANSACTIONS

All Communications relating to this Journal should be addressed to the

PALAEONTOLOGICAL SOCIETY OF JAPAN

Geological Institute, Faculty of Science, University of Tokyo, Japan

Trans Proc. Palaeont. Soc. Japan, N.S., No. 26, pp. 41—46, pl. 8, June 15, 1957

312. *MESOSCHUBERTELLA*, A NEW PERMIAN FUSULINID GENUS FROM JAPAN*

MOSABURO KANUMA

Department of Geology, Tokyo Gakugei University

and

SUMIO SAKAGAMI

Department of Geology, Hokkaido Gakugei University.

日本の二畳系産紡錘虫の新属 *Mesochubertella*： 先に報告（未記載）した紡錘虫 *Schubertella? shimadaniensis* KANUMA 及び *Schubertella? thompsoni* SAKAGAMI を再検討した結果，この二種に対して新属を設けるのが適当であると考えるので．この属に *Mesoschubertella* と命名し，こゝに報告する。本属は *Eoschubertella* 及び *Schubertella* に似ているが，その wall の構造が異つている。新属 *Mesoschubertella* は亜科 *Schubertellinae* に編入さるべきもので *Schubertellinae* の wall の構造の進化系統は *Fusulininae* のそれと似ている。尚，COLANI が中国から記載報告した *Neofusulinella praecursor* var. *pusilla* は恐らく *Mesoschubertella* 属に入れらるべきものであろう。

鹿沼茂三郎・坂上澄夫

Schubertella ? shimadaniensis reported by KANUMA, from Shimadani, Hachiman-chô, Gifu Prefecture, Mino massif, and *Schubertella ? thompsoni* recored by SAKAGAMI in the limestone pebbles of the Tamanouchi limestone conglomerate from Hinode-mura, Nishitama-gun, Tokyo-to, Kwantô massif, are two species which differ from the true *Schubertella* in their spirothecal structure. A restudy of the internal structures of these two species have led the writers to the conclusion that for them a new genus must be established because they cannot be referred to *Schubertella*, even if it were possible to extend the limits of that genus.

In describing the subgenus *Eoschubertella* THOMPSON (1937) pointed out that it is distinguished from *Schubertella* by the spirothecal structure, namely, the spirotheca of *Schubertella* is composed of a tectum and a lighter inner layer "diaphanotheca" and that of *Eoschubertella* of a tectum and upper and lower tectoria; diaphanotheca typically very thin and cannot be recognized in most sections. Later, DUNBAR and SKINNER (1937) proposed to raise the subgenus to generic rank.

Since, the spirothecal structure of the present specimens is composed of a tectum, a diaphanotheca and a lower tectorium, it becomes necessary to establish a new genus, and here we propose the name *Mesoschubertella* with *M. thompsoni* SAKAGAMI, n. sp. as the type species.

Neofusulinella praecursor var. *pusilla* described and illustrated by COLANI (1924) from China may be referable to *Mesoschubertella*. In China, *Neofusulinella praecursor* var. *pusilla*

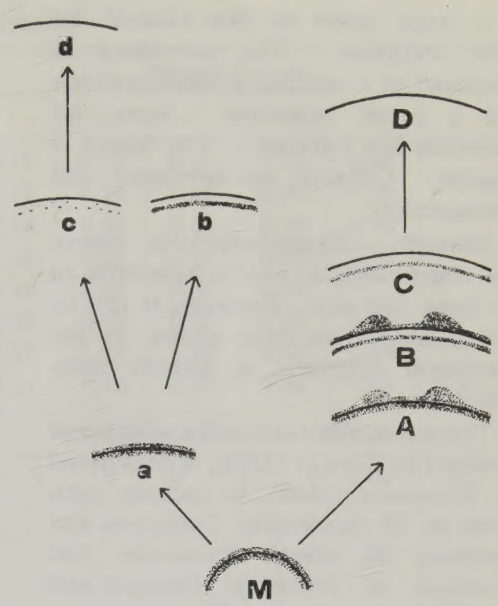
* Read June 20, 1956; received Sept. 10, 1956.

occurs in association with *Fusulina chamchitensis* COLANI which seems to include some specimens of *Pseudofusulina vulgaris* (SCHELLWIEN), therefore its geological age may correspond to the middle to upper Wolfcampian in recent sense. *Neofusulinella praecursor* DEPRAT (1913) which was first described from the Moscovian of Cammon (Laos) and subsequently from Ban-Tac, San-Xa and so forth by COLANI (1924) belongs to the genus *Fusulinella*, as already pointed out by THOMPSON (1934).

In the Mino massif, *Mesoschubertella shimadaniensis* KANUMA, n. sp. occurs in association with *Staffella* sp., *Minojapanella elongata* FUJIMOTO and KANUMA, *Pseudofusulina vulgaris* var. *fusiformis* (SCHELLWIEN) and *Pseudofusulina* sp. and in the Kwantô massif, *Mesoschubertella thompsoni* SAKAGAMI, n. sp. occurs in association with *Nankinella* sp., *Staffella mölleri* OZAWA, *Pseudostaffella? tamanouchiensis* SAKAGAMI, *Pseudofusulina vulgaris* (SCHELLWIEN), *Pseudofusulina vulgaris* var. *globosa* (SCHELLWIEN) and *Pseudofusulina* sp. From their faunal assemblages, the geological range of the present new genus may be from the middle to the upper Wolfcampian.

Mesoschubertella apparently is closely related to *Eoschubertella*, a genus which has the spirotheca composed of a tectum and thin upper and lower tectoria. *Mesoschubertella* has the spirotheca composed of a tectum, a diaphanotheca and a lower tectorium and the spirotheca of *Schubertella* is composed of a tectum and lower clear layer or a single layer. The evolutional trend of the subfamily Schubertellinae somewhat resembles that of the Fusulininae as shown in the text figure.

The writers wish to express their thanks to Prof. Haruyoshi FUJIMOTO of the Geological and Mineralogical Institute, Tokyo University of Education, for his kind guidance and kind loan of the necessary literatures.



Text figure. Comparison of the evolution of the spirotheca of Schubertellinae and Fusulininae.
M.—*Millerella*.
a-d.—Schubertellinae. a, *Eoschubertella*; b, *Mesoschubertella*; c, d, *Schubertella*.
A-D.—Fusulininae. A, *Profusulinella*; B, *Fusulinella* and typical *Fusulina*; C, *Fusulina cylindrica*; D, *Gallowaiinella*.

Mesoschubertella KANUMA and SAKAGAMI, n. gen.

Type species : — *Mesoschubertella thompsoni* SAKAGAMI, n. sp.

Diagnosis :—Shell minute, inflated to elongate fusiform, having slightly concave or somewhat convex lateral slopes. Mature specimens measure 1 to 2 mm in length and less than 1 mm in width, and consist of four to five volutions. The form ratios are 1 : 1.4 to 1 : 2.5. The first two to three volutions are coiled

at a large angle to the axis of the outer volutions. The spirotheca is composed of a tectum, a diaphanotheca and a lower tectorium. Septa are numerous and unfluted. The tunnel is singular. Chomata are developed and asymmetrical.

Remarks :—*Mesoschubertella* resembles *Eoschubertella* and *Schubertella* in its shape and size. However, it can be distinguished from those genera by the spirothecal structure, as already mentioned.

The genus *Neofusulinella* which was proposed by DEPRAT (1912), is considered by THOMPSON (1948) to include such forms as *N. occidentalis* THOMPSON and WHEELER, *N. montis* THOMPSON and WHEELER, *N. lantenoisi* DEPRAT and *Fusulinella itoi* OZAWA. However, in a later paper, THOMPSON (1951) stated that the first two mentioned species should be referred to the new genus *Pseudofusulinella*. In the same paper, he stated with regard to "*Neofusulinella* (*Yangchienia*) *itoi* (OZAWA)" that "Professor R. TORIYAMA is now restuding this form (*N. itoi*) at Wisconsin and finds that it is referable to *Fusulinella* MÖLLER and is associated with a typical Middle Pennsylvanian (Moscovian) fauna.". Accordingly, *N. lantenoisi* is the only species referable to the genus *Neofusulinella*. COLANI (1924) described one form from the "Uralian" of China as *N. praecursor* var. *pusilla* COLANI, which occurs in association with *Fusulina chamchitensis* COLANI. However, this variety is distinctly different from *Neofusulinella* and seems to belong to *Mesoschubertella*.

Geological range :—From the associated fusulinid species, the geological age of the type species and of a newly described species is from the middle to upper Wolfcampian.

Mesoschubertella thompsoni

SAKAGAMI, n. sp.

Pl. 9, Figs. 1—10.

Shell minute and bulged fusiform. The lateral slopes are slightly convex. The first one to two volutions are coiled at a large angle to the axis of the outer volutions. The length and width in the fifth volution measure about 1 mm and 0.7 to 0.9 mm, respectively, with a form ratio of 1 : 1.2 to 1 : 1.5.

Proloculus is minute. Its average outside diameter is about 0.05 mm for eight specimens. Septa are numerous and are slightly fluted. Spirotheca relatively thick, and composed of a tectum, a diaphanotheca and a lower tectorium.

The tunnel is low and narrow, its height being about one-third that of the chamber. The tunnel angle varies from 20° to 29° in the fourth volution. The chomata is developed and asymmetrical.

Remarks :—The present new species resembles *Neofusulinella praecursor* var. *pusilla* COLANI, which was reported from China and may be referable to the genus *Mesoschubertella*. However, the present species can be distinguished from *N. praecursor* var. *pusilla* by the larger shell, thicker spirotheca and more distinct chomata. This new species is named in honour of Dr. M. L. THOMPSON.

Geological age and occurrence :—The present new species occurs in association with *Nankinella* sp., *Staffella mölleri* OZAWA, *Pseudostaffella ? tamanouchiensis* SAKAGAMI, *Pseudofusulina vulgaris* (SCHELLWIEN), *Pseudofusulina vulgaris* var. *globosa* (SCHELLWIEN) and *Pseudofusulina* sp. in a limestone pebble of the Tamanouchi limestone conglomerate in the Yagooki Valley, Tamanouchi, Hinode-mura, Nishitama-gun, Tokyo-to,

Measurements of *Mesoschubertella thompsoni* SAKAGAMI, n. sp. (in mm).

Specimen	L	W	R	P	Rate of Growth					
					1	2	3	4	5	6
2521-C		0.79		0.06	0.11	0.19	0.34	0.53	0.79	
2525-E	1.02	0.70	1.5	0.05	0.11	0.20	0.35	0.59	0.70	
2525-F		0.92		0.05	0.14	0.29	0.46	0.70	0.92	
2526-I	0.95	0.78	1.2	0.05	0.10	0.19	0.32	0.53	0.78	
2527-D		0.70		0.05	0.14	0.29	0.46	0.70		
2611-A	1.00	0.75	1.3	0.05	0.09	0.17	0.29	0.49	0.75	
2611-B		0.62		0.05	0.17	0.19	0.32	0.49	0.62	
2611-C		0.95		0.05	0.12	0.19	0.35	0.56	0.84	0.95

Specimen	Thickness of Spirotheca					Septal count				Tunnel angle		
	1	2	3	4	5	2	3	4	5	2	3	4
2521-C	.009	.021	.025	.038	.034		14	15				
2525-E	.009	.025	.034	.051	.030					5	18	22
2525-F	.013	.025	.029	.025	.025	7	16	18	22			
2526-I	.017	.025	.032	.026	.040						24	29
2527-D	.017	.024	.021	.024								
2611-A	.006	.009	.021	.042	.038					18	20	20
2611-B	.009	.013	.034	.034	.034							
2611-C	.009	.013	.030	.034	.042	7	13	17	20			

Japan. Its geological age may correspond to the upper Wolfcampian.

Repository:—All of the specimens treated in this paper are preserved in the collection of the Department of Geology, Hakodate school, Hokkaidô Gakugei University. Reg. No. 2611-A (Holotype), 2521-C, 2525-E, 2525-F, 2525-G, 2526-I, 2527-D, 2611-B, 2611-C (Paratypes).

Mesoschubertella shimadaniensis KANUMA, n. sp.

Pl. 9, Figs. 11—19.

Shell minute and typical to elongate fusiform with slightly convex lateral slopes and narrowly rounded poles. The first one to two volutions are coiled at a large angle to the axis of the outer volutions. The length and width in the fifth volution measure 1.26 to 1.53 mm and 0.64 to 0.82 mm, respectively, with a form ratio of 1: 1.4 to 1: 2.1.

Proloculus is minute. Its average outside diameter is about 0.05 mm for eight specimens. Septa are numerous and slightly fluted. The spirotheca of endothyroid juvenarium is thin, but that of outer volutions is relatively thick. The spirotheca is irregular laterally and the septal furrow is deep. It is composed of a tectum, a diaphanotheca and a lower tectorium.

The tunnel is narrow and its height is about one half that of the chamber. The chomata is developed and asymmetrical.

Remarks:—The present new species can be distinguished from *Mesoschubertella thompsoni* SAKAGAMI, n. sp. by the rugose spirotheca, larger form ratio and more narrowly rounded poles.

Measurements of *Mesoschubertella shimadaniensis* KANUMA, n. sp. (in mm).

Specimen	L	W	R	P	Rate of Growth					
					1	2	3	4	5	6
23912-A		0.57		0.05	0.10	0.19	0.31	0.43	0.57	
23916-A	0.88	0.69	1.3	0.06	0.10	0.19	0.35	0.56	0.69	
23916-B		0.92		0.06	0.11	0.20	0.29	0.45	0.78	0.92
23916-C		0.80		0.05	0.10	0.19	0.29	0.45	0.68	0.80
23917-A	1.23	0.87	1.4	0.04	0.14	0.24	0.38	0.60	0.87	
23918-A	1.32	0.74	1.8	0.06	0.09	0.16	0.24	0.49	0.59	0.74
23918-B	1.26	0.71	1.8	0.05	0.08	0.14	0.28	0.45	0.71	
23918-C	1.26	0.83	1.5	0.05	0.09	0.21	0.35	0.56	0.83	

Specimen	Thickness of Spirotheca						Septal count			Tunnel angle		
	1	2	3	4	5	6	3	4	5	3	4	5
23912-A	.006	.017	.028	.028	.028							
23916-A	.006	.017	.028	.034	.028						28	21
23916-B	.006	.017	.025	.028	.022	.017	9	13	15			
23916-C	.006	.017	.017	.022	.028	.017	9	11	16			
23917-A	.006	.017	.020	.034	.034					12	24	27
23918-A	.006	.011	.017	.025	.028	.034				20	29	35
23918-B	.006	.011	.017	.021	.022					29	39	
23918-C	.006	.017	.022	.028	.028					26	?	

Geological age and occurrence :—The present species occurs in association with *Staffella* sp., *Minojapanella elongata* FUJIMOTO and KANUMA, *Pseudofusulina vulgaris* var. *fusiformis* (SCHELLWIEN) and *Pseudofusulina* sp. in the limestone of Shimadani, Hachiman-chô, Gifu Prefecture. The geological age may correspond to the upper Wolfcampian.

Repository :—All of the specimens treated in this paper are preserved in the collection of the Department of Geology, Koganei School, Tokyo Gakugei University. Reg. No. 23918-A (Holotype), 23912-A, 23916-A, 23916-B, 23916-C, 23917-A, 23918-B, 23918-C (Paratypes).

References

COLANI, M. (1924), Nouvelle contribution a l'étude des Fusulinidés de l'Extreme-Orient: *Indochine Service Géol., Mém., Vol. 11, fasc. 1*, pp. 1-191, pls. 1-29, graph 1-28.

DEPRAT, J. (1912), Étude des Fusulinidés de Chine et d'Indochine et classification des calcaires à fusulines: *Indochine Service Géol., Mém., Vol. 1, fasc. 3*, pp. 1-76, pls. 1-9.

—— (1915), Étude des Fusulinidés de Chine et d'Indochine et classification des calcaires à fusulines (IVe Mémoire). Les Fusulinidés des calcaires carbonifériens et permiens du Tonkin, du Laos et du Nord-Annam: *Indochine Service Géol., Mém., Vol. 4, fasc. 1*, pp. 1-30, pls. 1-3.

DUNBAR, C. O. and SKINNER, J. W. (1937), The geology of Texas, vol. III, part 2, Permian Fusulinidae of Texas: *Texas Univ. Bull. 3701*, pp. 517-825, pls. 42-81.

ENDO, R. and KANUMA, M. (1954), Stratigraphical and Paleontological Studies of the Later Paleozoic Calcareous Algae in Japan, VII —— Geology of the Mino mountain-

land and Southern part of Hida plateau, with descriptions of the algal remains found in those districts ——: *Sci. Rep. Saitama Univ., Ser. B, Vol. 1, No. 3*, pp. 177–208, pls. 5.

SAKAGAMI, S. (1956), Fusulinids from the limestone conglomerate in the Yagooki Valley, Tamanouchi, Hinode-mura, Nishitama-gun, Tokyo-to, Japan: *Trans. Proc. Palaeont. Soc. Japan, New Ser., No. 24*, pp. 259–265, pl. 37.

THOMPSON, M. L. (1934), The Fusulinids of the Desmoines Series of Iowa: *Univ. Iowa Studies, New Ser., Vol. 16*, pp. 272–332, pls. 20–23.

—— (1937), Fusulinids of the Subfamily Schubertellinae: *Journ. Paleont., Vol. 11*, pp. 118–125, pl. 22.

—— (1948), Studies of American fusulinids: *Univ. Kansas Palcont. Contr., Protozoa, Art. 1*, pp. 1–184, pls. 1–38.

—— (1951), New genera of fusulinid Foraminifera: *Cushman Found. Foram. Research Contr., Vol. 2*, pp. 115–119, pls. 13–14.

—— (1954), American Wolfcampian fusulinids: *Univ. Kansas Paleont. Contr., Protozoa, Art. 5*, pp. 1–226, pls. 1–52.

Explanation of Plate 8.

Figs. 1–10. *Mesoschubertella thompsoni* SAKAGAMI, n. sp.

Figs. 1, 3, 10. Cross sections of paratypes, ×30. Reg. no. 2521–C, 2525–F, 2611–C, respectively.

Figs. 2, 5. Axial sections of paratypes, ×30. Reg. no. 2525–E, 2526–I, respectively.

Fig. 4. Tangential section, ×30. Reg. no. 2525–G.

Fig. 6. Axial section of holotype, ×30. Reg. no. 2611–A.

Fig. 7. Enlarged part of the holotype, showing the structure of the spirotheca, ×100.

Figs. 8, 9. Centered oblique sections of paratypes, ×30. Reg. no. 2527–D, 2611–B, respectively.

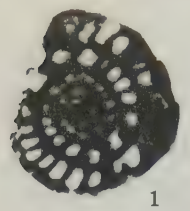
Figs. 11–19. *Mesoschubertella shimadaniensis* KANUMA, n. sp.

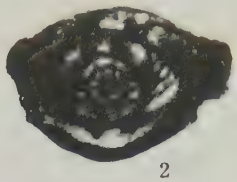
Figs. 11, 13, 14. Cross sections of paratypes, ×30. Reg. no. 23912–A, 23916–B, 23916–C, respectively.

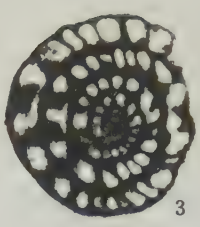
Figs. 12, 15, 18, 19. Axial sections of paratypes, ×30. Reg. no. 23916–A, 23917–A, 23918–B, 23918–C, respectively.

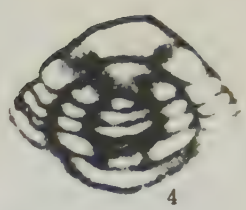
Fig. 16. Axial section of holotype, ×30. Reg. no. 23918–A.

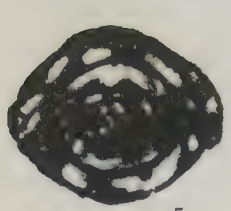
Fig. 17. Enlarged part of the holotype, showing the structure of the spirotheca, ×100.

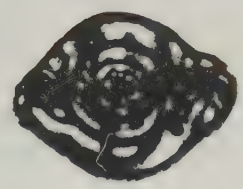

1


2

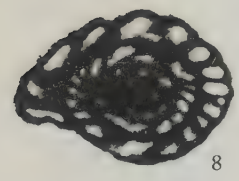

3

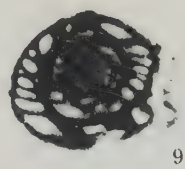

4

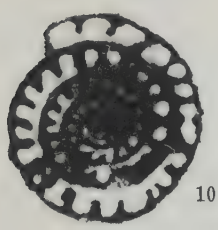

5

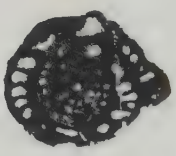

6


7


8

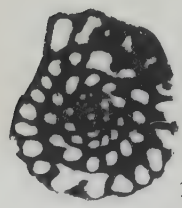

9

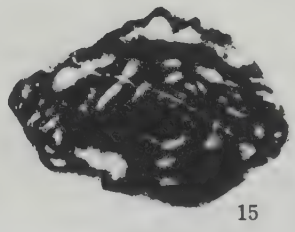

10

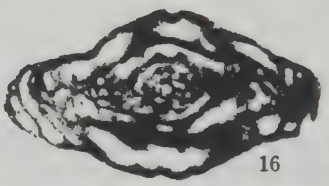

11

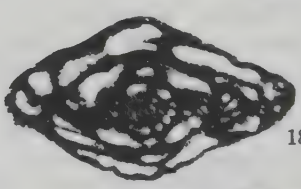

12

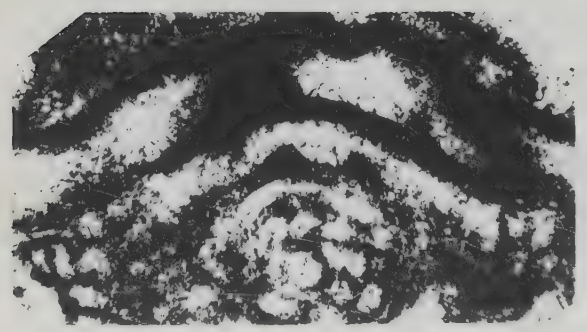

13

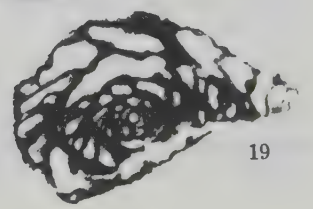

14


15


16


18


17


19

Trans. Proc. Palaeont. Soc. Japan, N. S., No. 26, pp. 47—50, pl. 9, June 15, 1957

313. NEW SPECIES OF *SIPHONODENDRON* FROM JAPAN*

MASAO MINATO and MAKOTO KATO

Department of Geology and Mineralogy, Faculty of Science, Hokkaido University.

本邦産 *Siphonodendron* 珊瑚の 2 新種：京都府加佐郡大江町蓼原の二疊系，舞鶴層群の石灰岩礫および，兵庫県養父郡南谷村糸原新倉谷の下部三疊系御祓山層群の黒色頁岩礫より中沢，志岐，野上氏等によつて採集された珊瑚について記載した。何れも *Siphonodendron* に属する新種で，従来中国の石炭系より報告されているものに近い性質を有する。蓼原のものには *S. nakazawai*, 糸原のものには *S. japonicum*, なる新種名を附して報告する。

湊　正雄・加藤　誠

The present short note offers a description of two corals which were found by K. Nakazawa, T. Shiki, and Y. Nogami, Geological Institute of Kyoto University, in the limestone pebbles of conglomerates in different horizons. One of the corals was derived from a conglomerate, a member of the Permian Maizuru group, (Loc. A in the annexed map); while the other form from a conglomerate, a member of the Lower Triassic Miharaiyama group (Loc. B). Both conglomerates develop in the region of the so-called Maizuru tectonic zone, extending obliquely from northern Kyoto to Okayama prefecture.

Both of these two corals now under consideration belong to the genus *Siphonodendron* and show more similarity to the known species from the Carboniferous of China than to any other species. These Japanese forms are specifically distinct from all species hitherto described.

It is not certain at the present moment, where the source rocks yielding such corals develop, however, the original rocks may be Carboniferous in age, but not the Permian.

Before presenting the description, the writers would like to express their cordial thanks to Messers. K. Nakazawa, T. Shiki, and Y. Nogami for their courtesy in submitting their specimens for study.

Description of Species

Family Lithostrotiontidae Grabau, 1927

Genus *Siphonodendron* M'Coy, 1849

Siphonodendron japonicum, sp. nov.

Pl. 9, Figs. 7—10.

Corallum compound, fasciculate and phaceloid. Corallites cylindrical, round in cross section, the calicular diameter reaching 7 to 8 mm in cross section in their full grown stages. Corallites are quite close to each other, the interspace being not more than 3mm. Major septa well developed, numbering as many as 24, 25? nearly straight, extending to the central area, but most of them do not directly unite with the columella. Wall rather thin. Minor septa wholly absent. Columella thin, usually firmly united

* Read June 20, 1956; received June 30, 1956.

with the cardinal and counter septum. Dissepiments are concentrically arranged in two or three? rows.

In the logitudinal section, the tabulae are inclined very steeply toward the columella, counting 3 in a distance of 2 mm. The dissepimental vesicles are unequal in size, arranging in at least two rows, with convex sides faced inward.

Remarks:—The present form resembles *Lithostrotion* (*Siphonodendron*) *irregulare* var. *jungtungense* described by Yü from the Lower Carboniferous of China in respect to size, septal number, and in near absence of the minor septa. However, the former is easily separable from the latter in the different nature of the tabulae and of dissepiments.

From the size, septal number and the nature of columella and tabulae, the Japanese form shows somewhat similarity to *Lithostrotion* (*Siphonodendron*) *petalaxoidea* of Yü, but the latter possesses definite minor septa.

Lithostrotion (*Siphonodendron*) *yaolingense* CHU described by CHU from the Middle Carboniferous of China is also somewhat allied to the present form in respect to size of the corallites, and septal number, but the Chinese form has minor septa, although they are much reduced in length in some corallites.

Further, the tabulae of the Chinese form show much more complicated structure than the Japanese one.

Locality:—Niikuradani, near Itohara, Minamitani village, Yabu-gun, Hyogo Prefecture, Japan.

Collector:—K. NAKAZAWA and T. SHIKI.

Reg. no.:—12443 (i—viii).

Note:—The present material was obtained from pebble of a conglomerate, a member of the Lower Triassic Miharaiyama group.

The pebbles containing this fossil are silicified black shale, 5×4×1.5 cm in size. Other pebbles found together with this pebble which contained the fossil are porpyhrite, chert and so on.

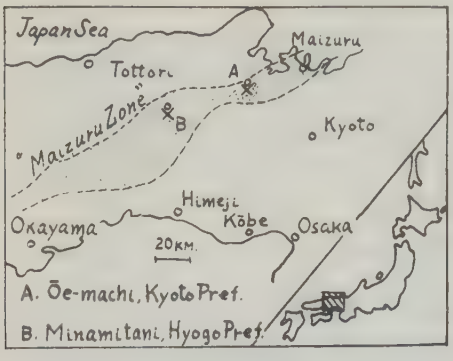
Siphonodendron nakazawai, sp. nov.

Pl. 9, Figs. 1—6.

Corallum compound, fasciculate. Corallites round in cross section, rather irregularly spaced with each other, sometimes closely in contact, but rarely separated by a space as great as 6 mm, calicular diameter 7 to 8 mm in the mature stage, major septa well developed, numbering as many as 26, very thick near the wall, becoming gradually thin and flexious towards the axial part, most of them reaching the columella; minor septa alternating with the major ones are very short, confinding only in the dissepimentarium; wall moderate in thickness; columella distinct, thickened fusiform in cross section; observed to be usually united with the counter and cardinal septum; dissepimentarium rather narrow, where dissepiments are arranged in two or three rows.

In the longitudinal section, 6 tabulae are contained in a space of 5 mm, steeply ascending towards the columella in the central portion, bending downwards at the margin; dissepimental vesicles unequal in size, arranged usually in two rows, but rarely three rows, with their convex sides faced upwards and inwards.

Remarks:—The present specimens are quite unique in having very short minor septa and steeply ascending tabulae in the central portion. Also the septal number twenty-six is quite constant throughout all corallites in



Text-fig. Locality map.

the mature stage.

From the size and number of septa the present specimens now in concern are somewhat allied with *Lithostrotion* (*Siphonodendron*) *curvatum* Yü described and figured by Yü from the Lower Carboniferous of Kueichow, the latter of which has also quite steeply ascending tabulae in the central portion, but provides dissepimental vesicles arranged in only one row.

Lithostrotion (*Siphonodendron*) *irregulare* var. *jungtungense* Yü has tabulae quite similar to those of the Japanese form now in concern, which are steeply ascending towards the columella. However, the Chinese form has less numerous major septa and almost wholly lacks the minor septa; besides this, the former possess dissepimentarium with dissepiments arranged in only one row.

Also *Siphonodendron yaolingense* described by Chu shows some affinity to the Japanese form in having very steeply ascending tabulae and dissepiments arranged in two or three rows, but the former has less numerous septa.

Lastly, *Lithostrotion ramosus* Romanowsky figured by Yabe and Hayasaka from South China may be closely related to *Lithostrotion* (*Siphonodendron*) *curvatum*, except for the septal number and the strength of the columella; the former also resembles the Japanese specimens, but the Chinese form bears dissepiments almost equal in size.

Locality:—Tadewara, Ōe-machi, Kasa-Gun, Kyoto Prefecture.

The present material was found in the water worn pebble of the conglomerate, a member of the Permian Maizuru group.

Coll.:—K. Nakazawa and Y. Nogami.

Reg. no.:—12442 (i—iii).

References

Benson, W. N. and Smith. S. (1923), On some rugose corals from Burindi series (Lower Carboniferous) of New South Wales, together with a short account of the Upper Palaeozoic rocks of the area in which they were collected. *Q. J. G. S., vol. 79*, p. 156.

Chi, Y. S. (1931), Weiningian (Middle Carboniferous) corals of China. *Pal. Sinica, ser. B, vol. 12, fasc. 5.*

—— (1935), Notes on some Carboniferous and Permian corals of Dr. Erik Norin's collection from Sinkiang Province. *Bull. Geol. Soc. China, vol. 14*, p. 23.

Chu, S. (1928), Upper Palaeozoic formations and faunas of Yaoling, Chenhsien, S. Hunan. *ibid., vol. 7*, p. 61.

Edwards, M. and Haime, J. (1852), British fossil corals, pt. 3. *Mon. Pal. Soc. London.*

Hill, D. (1934), The Lower Carboniferous corals of Australia. *Proc. Roy. Soc. Qnslnd., vol. 45, no. 12.*

—— (1940), Carboniferous rugose corals of Scotland, pt. 3, *Mon. Pal. Soc. London.*

Kelly, W. A. (1942), Lithostrotiontidae in the Rocky mountains. *Jour. Pal., vol. 16*, p. 351.

Lang, W. D., Smith, S. and Thomas, D. (1940), Index of Palaeozoic coral genera. Brit. Mus.

Lee, J. S., Chen, S. and Chu, S. (1930), Huanglung limestone and its fauna. *Mem. Nat. Res. Inst. Geol. (Acad. Sinica), vol. 9*, p. 85.

Lewis, H. P. (1930), The Avonian succession in the south of Isle of Man. *Q. J. G. S., vol.*

86, p. 275.

McLAREN, D. J. and SUTHERLAND, P. K. (1949), *Lithostrotion* from Northeast British Columbia and its bearing on the genomorph concept. *Jour. Pal., vol. 23*, p. 625.

MENCHIKOFF, N. and HSU, T. Y. (1935), Les polypiers Carbonifères du Sahara occidental. *Bull. Soc. Géol. France, ser. 5, tome 5*, p. 229.

MERRIAM, C. W. (1942), Carboniferous and Permian corals from Central Oregon. *Jour. Pal., vol. 16*, p. 372.

MINATO, M. (1943), Notes on some Lower Carboniferous fossils from the Kirin formation. *Jour. Fac. Sci. Hokkaido Imp. Univ., ser. 4, vol. 7, no. 1*, p. 59.

—— (1943), On some Upper Viséan coral fauna from the coral limestone of the Kitakami mountainland. *Jour. Sigenkagaku Kenkyusho, vol. 1, no. 2*, p. 221,

—— (1943), Unterkarbonfauna in der Mandschurei. *Bull. Geol. Inst. Manchoukuo, no. 106*, p. 27.

—— (1955), Japanese Carboniferous and Permian corals. *Jour. Fac. Sci., Hokkaido Uuiv., ser. 4, vol. 9, no. 2.*

PHILLIPS, J. (1836), Geology of Yorkshire, pt. 2.

SLOSS, L. L. (1945), Corals from Post-Osage Mississippian of Montana. *Jour. Pal., vol. 29*, p. 309.

SMITH, S. (1928), Carboniferous coral *Nemistium edmondsi*, gen. et sp. n. *Ann., Mag. Nat. Hist., ser. 10, vol. 1*, p, 112.

THOMSON, J. and NICHOLSON. A. (1876), Contributions to the study of the chief generic types of the Palaeozoic corals. *Ibid., ser. 4, vol. 17*, p. 290.

WEISSERMEL, W. (1935), Ueber ein kieselgestein mit *Lithostrotion junceum* aus Thüringen. *Zeit. deutsch. Geol. Gesell., Bd. 87*, p. 115.

YABE, H. and HAYASAKA, I. (1915—1916), Palaeozoic Corals from Japan, Korea and China. *Jour. Geol. Soc. Tokyo, vol. 22*, p. 127, (1915); *vol. 23*, p. 57. (1916).

—— (1920), Palaeontology of Southern China, in *Geogr. Res. in China, vol. 3.*

YABE, H. and SUGIYAMA, T. (1939), Discovery of Lower Carboniferous Corals from the Yatsusiro district in Kyushu. *Proc. Imp. Acad. Tokyo, vol. 15*, p. 303.

YÜ, C. C. (1933), Lower Carboniferous Corals of China. *Pal. Sinica, ser. B, vol. 12, fasc. 3.*

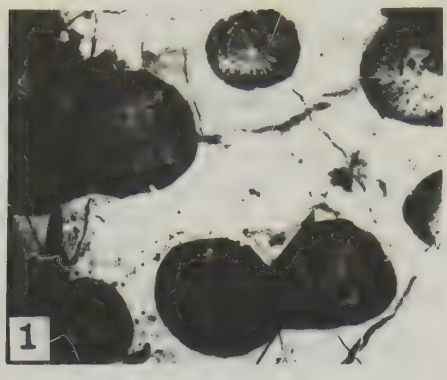
Explanation of Plate 9

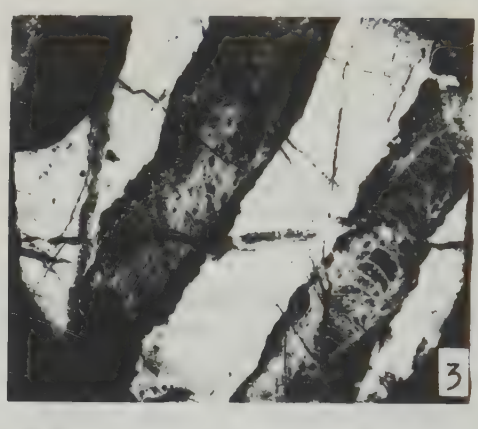
Figs. 1—6: *Siphonodendron nakazawai* MINATO et KATO.

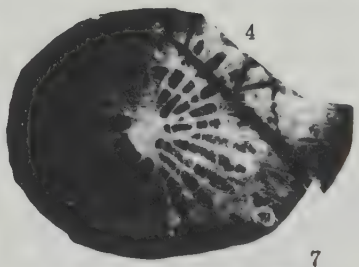
Fig. 1. Cross section, ×2. Reg. No. 12442-i.
Fig. 2. Cross section, ×2. Reg. No. 12442-ii.
Fig. 3. Longitudinal section, ×2. Reg. No. 12442-iii.
Fig. 4. Cross section, ×5. (A part of Fig. 2).
Fig. 5. Cross section, ×5. (A part of Fig. 1).
Fig. 6. Longitudinal section, ×5. (A prat of Fig. 3).

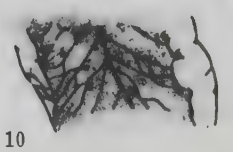
Figs. 7—10: *Siphonodendron japonicum* MINATO et KATO.

Fig. 7. Cross section, ×3. Reg. No. 12443-iii.
Fig. 8. Longitudinal section, slightly oblique, ×3. Reg. No. 12443-vi.
Fig. 9. Cross section, ×3. Reg. No. 12443-iv.
Fig.10. Longitudinal section, ×3. Reg. No. 12443-vii.









Minato and Kato photo. and del.

Trans. Proc. Palaeont. Soc. Japan, N. S., No. 26, pp. 51-61, pls. 10-11, June 15, 1957

314. *NIPPONITRIGONIA* AND *RUTITRIGONIA* IN JAPAN*

TEIICHI KOBAYASHI

Geological Institute, University of Tokyo.

日本産の *Nipponitrigonia* と *Rutitrigonia*: —*Rutitrigonia* は後方に延びた形の三角貝で白堊紀に世界的に分布していたが，日本では佐川盆地の海成領石統に一種を産するに過ぎない。之に反して *Nipponitrigonia* はその名の示すように日本に多産する。Cox はその時代を白堊紀後期と記しているが，実は侏羅紀中期または後期から白堊紀中期の間に約5種が知られている。これは表面の平滑化した属である。この機会に三角貝類の rostration 及び effacement の両方向の進化を論じ，その結果多元的に随時随所に類似の属を生じた事を明かにした。 小林貞一

Rutitrigonia is a rostrate Trigonian genus cosmopolitan in the Cretaceous period. *Rutitrigonia yeharai* KOBAYASHI, 1954, i.e. *Trigonia neumayri* YEHARA, 1923, non CHOFFAT, 1885, is a sole representative of the genus in Japan whose occurrence is restricted to the Trigonian sandstone at Yamanokami of Nagano in the Sakawa basin, Shikoku island.

Nipponitrigonia is, as suggested by its name, very common and extensively distributed in Japan from Upper or (?) Middle Jurassic to Middle Cretaceous. It is a smooth Trigonian genus and comprises the followings:

Nipponitrigonia sagawai (YEHARA)
Nipponitrigonia naumanni (YEHARA)
Nipponitrigonia kikuchiana (YOKOYAMA)
Nipponitrigonia convexa KOBAYASHI, new species
Nipponitrigonia (?) *sakamotoensis* (YEHARA)

In describing these species in the two genera, the evolution of the Trigonians in the trends of E or effacement and R or rostoration is discussed in this paper. I am much indebted to Prof. S. HANZAWA of the Tohoku University at Sendai and Prof. S. MATSUSHITA of the Kyoto University for the facility of studying Trigonian collections at these universities and to Mr. Masahisa AMANO, lecturer of the Kumamoto University for assistance in preparation of this paper.

The E Trend of Evolution in Trigonians

Not only in Trigonians but in many other fossils also simple smooth forms are more diffcult to classify than decorated elegant forms. In smooth Trigonians the shell outline and convexity, size, position and curvature of the umbo and strength of carinae are most criteria for classification. If any relic of surface sculpture is found in the umbonal region, it serves for an indispensable clue to inspect the lineage. *Asiatotrigonia* is, for example, a simple, obliquely ovate form, but v-shaped costae on the umbo tell its derivation from the Vaugoniinae stock. Among the majority

* Received Sept. 12, 1956; read at the Annual Meeting of the Palaeontological Society of Japan, Feb. 9, 1957, at Tokyo.

of effaced forms there are some showing the source of effacement. *Trigonia leana* GABB, for instance, is a member of *Steinmannella* which reveals effacement of rows of tubercles in various degrees. In *Steinmannella californica* (PACKARD) the process is so advanced that only low tubercles remain (PACARD, 1921).

As discussed elsewhere (KOBAYASHI and MORI, 1955), *Laevitrigonia*, mostly European Jurassic, and *Eselaevitrigonia*, mostly Cretaceous of the Indo-Pacfic province are two independent off-shoots from the Trigoniinae stock. Between them the developement of an antecarinal sulcus is a common feature, but there are many other differences.

Trigonia beesleyana LYCETT, monotypic of *Psilotrigonia*, may also be a derivative from the same stock, but it is quite unlikely that it was derived through *Laevitrigonia*, because its costellae on the area developed along the D trend at the same time with the effacement of the costae on the disk. The escutcheon is absent or undefined. The area is separated from the disk by a sharp marginal angulation which is arcuate with convexity on the ventral side. There is no antecarinal sulcus as seen in *Laevitrigonia*.

Liotrigonia COX whose monotype is *Trigonia lingonensis* DUMORTIER from British middle Lias has a well defined area and escutcheon and the former is bipartate. There are still concentric markings on the disk, but the beak is orthogyrous. According to COX it "seems to be descended from the smooth Myophoriids." Is it less probable, its being an early off-shoot of the Trigoniinae or Prosogyrotrigoniinae, because the essential features of the shell are already typical of the Trigonians.

As YEHARA compared *Trigonia kikuchiana* with that species, they are similar, but in the former the area is simple and the escutcheon undefined. In *Nipponitrigonia* typified by this species a few but strong concentric costae and a marginal carina are sometimes met with near the umbo. Such a juvenile shell is not essentially different from *Frenguelliella*. Therefore it is quite certain that it was introduced from the Trigoniinae stock. There are no marginal carina, but exists an angulation which is well rounded in *sakamotoensis*. Though somewhat undulated, many costae remain on the ante-mesial part of the species.

As mentioned above, there are various effaced Trigonians. Their morphic difference combined with that of speciotemporal distribution shows that they are polyphyletic in origin.

Genus *Nipponitrigonia* COX

1952. *Nipponitrigonia* COX, *Proc. Malacol. Soc. London, Vol. 29*, p. 53.

Diagnosis:—Shell trigonally ovate, fairly short, moderately inequilateral; umbo prominent. Marginal carina obtuse, convex upward and rounded off in later stages. Area smooth; escutcheon undefined. Concentric costae frequently present at umbo, but later smooth or persistent only on anterior side.

Type Species:—*Trigonia kikuchiana* YOKOYAMA.

Remark:—On the basis of *Trigonia kikuchiana* COX instituted this genus and referred *Trigonia naumanni* YEHARA to it. Subsequently *T. sagawai* YEHARA and *T. sakamotoensis* YEHARA were suggested as its members by KOBAYASHI (1954).

It is a remarkable fact that in Jurassic *sagawai* there are often an ante-

carinal and a post-carinal plication internally, but none in Cretaceous forms.

Distribution:—Eastern Asia; Upper or (?) Middle Jurassic to Middle Cretaceous. Cox cited "Upper Cretaceous, Japan," but modern stratigraphy has shown that there is no Upper Cretaceous occurrence in Japan (MATSUMOTO et al. 1954).

Nipponitrigonia kikuchiana (YOKOYAMA)

1892. *Trigonia kikuchiana* YOKOYAMA, *Jour. Coll. Sci. Imp. Univ. Tokyo, Vol. 4, Pt. 2*, p. 363, pl. 40, figs. 4, 5a-b, 6.
1892. *Trigonia rotundata* YOKOYAMA, *Ibid.* p. 365, pl. 40, figs. 7-9.
1915. *Trigonia kikuchiana* YEHARA, *Sci. Rep. Tohoku Imp. Univ. Sendai, 2d ser. Vol. 2*, p. 44, pl. 2, figs. 1-9.
1923. *Trigonia kikuchiana* YEHARA, *Jour Geol. Soc. Tokyo, Vol. 30*, p. 9, pl. 7, figs. 1-2.
1928. *Trigonia kikuchiana* YEHARA, *Japan. Jour. Geol. Geogr., Vol. 20*, p. 80, pl. 9, fig. 2, not fig. 1.
1931. *Trigonia kikuchiana* YEHARA, Trigoniae in Japan, p. 20, Text-fig.
1952. *Nipponitrigonia kikuchiana* COX, *Proc. Mal. Soc. London, Vol. 29*, p. 53.

Shell roundly subquadrate; marginal angulation obtuse, somewhat convex upward and crossing diagonally; umbo relatively small, located anterior to middle and incurved; disk large, sometimes somewhat depressed mesially near venter; surface smooth except a few concentric ridges and grooved on umbo.

This is the type species of *Nipponitrigonia*. With the Miyako specimens which are generally undeformed secondarily, YEHARA (1915) has shown that the outline and convexity of the shell and the aspect of the marginal angulation are fairly variable within this species. YOKOYAMA, when he established this species, distinguished *T. rotundata* from *T. kikuchiana*, but as noted by YEHARA, its validity is doubtful, because his materials came from the Katsuragawa, Ryoseki and Sakawa basins where the Lower Cretaceous and older formations are strongly disturbed by the Sakawa orogeny and accordingly the secondary deformation is added to the original variation in not a small amount.

Occurrence:—This species is widely distributed in the Lower Cretaceous formations in Honshu, Shikoku and Kyushu, for example, in the Moshi sandstone and Hiraiga calcareous sandstone of Miyako (Aptio-Albian), Prov. Rikuzen, the Hoji formation of Katsuragawa basin, Prov. Awa, the Monobegawa formation in Ryoseki and Sakawa basin, Prov. Tosa, the Trigonian sandstone of Yamanokami (Lower Neocomian) in Southern Sakawa basin, the Oshima series (Upper Neocomian) of Hachirusan in Yatsushiro area, Prov. Higo. The lower Goshonoura formation in the Amakusa islands, Prov. Higo may be the latest of the *kikuchiana*-bearing formations the age of which is possibly the lower Gyliakian, or Cenomanian.

Nipponitrigonia sagawai (YEHARA)

Plate 10, Figures 2-11.

1926. *Trigonia sagawai* YEHARA, *Japan. Jour. Geol. Geogr., Vol. 5*, p. 34, pl. 3, figs. 10 and 10a.
1954. *Nipponitrigonia sagawai* KOBAYASHI, *Ibid., Vol. 25*, p. 77.

Quite similar to *Nipponitrigonia kikuchiana*, but having short costae near the anterior margin. Internally plicated on one or two sides of the marginal angulation.

The costae inclined postero-ventrally are quite discordant with growth lines. In a specimen (fig. 5) from the 3rd Trigonian zone of Soma they are fairly stout and very dense, their intervals being almost as broad as the costae.

They are, however, generally slender and widely spaced in later forms from Soma as well as Sakawa and Kiritani specimens. In some from the 4th and 5th zones of Soma it is seen that the costae are stout in the umbonal area and two or three in the juvenile stage run across the shell from disk to area (fig. 8). The oblique anterior costae become in some Kiritani specimens so weak that they emerge only under cross light (fig. 9). Such a form is easily mistaken for *kikuchiana*.

Internally, however, this species can readily be distinguished from that species by the usual presence of one or two plications. The ante-carinal plication begins near the umbo, distinct in the ventral two-thirds and terminates at a protuberance near the margin. The other runs along the middle of the area as long as its half-length and the terminal protuberance is sometimes more prominent than that of the ante-carinal one. In Kambaradani specimens a few crenules are sometimes seen on the ventral margin in front of the ante-carinal plication (figs. 2-3).

These plications are always well represented by grooves on internal moulds. Because there is no distinct sulcus in the juxtaposition on the shell surface, it is certain that the shell is thickened internally at the plications. The two plications are generally distinct as seen in the Sakawa and Kiritani specimens, but in the Soma specimens the post-carinal one is often weak and the ante-carinal one imperceptible (fig. 7). Externally, however, a shallow but relatively broad depression is sometimes seen in front of the marginal angulation.

It is evident that *kikuchiana* could be introduced from *sagawai*-like form by the loss of the anterior costae, but *sagawai* may not be the true ancestor of *kikuchiana*. For the internal plicae are more developed in the later than in the earlier forms of *sagawai*, while they are totally absent in *kikuchiana*.

Occurrence:—Widely distributed in the Upper and (?) Middle Jurassic formations in Japan. In the Soma Jurassic in Province Iwaki, Fukushima Prefecture, this species occurs in the following zones:

1) The 3rd Trigonian zone at middle village of Awazu, Yamagami village.
2) The 4th Trigonian zone at Sugaya, Yamagami village.
3) The 5th Trigonian zone at Minahara, Kamimano village and south valley of Tomisawa, Yawata village.
4) The 6th Trigonian zone at middle valley of Tomisawa, Yawata village.

In Sakawa basin, Province Tosa, Kochi Prefecture, it is known at Kambaradani in Trigonian sandstone and at Mimikire in a shale where Kambaradani is the type locality. It is common in the Ushioi sandstone and shale at Kiritani, Unohana village, Niugun, Province Etchu, Toyama Prefecture.

Nipponitrigonia naumanni (YEHARA)

Plate 10, Figures 12-13, Plate 11, Figrues 1-2, (?) 3.

1921 *Trigonia kikuchiana* YEHARA, *Jour. Geol. Soc. Tokyo, Vol. 28*, pl. 5, fig. 3.
1923. *Trigonia naumanni* YEHARA, *Japan. Jour. Geol. Geogr., Vol. 2*, p. 81, pl. 8, figs. 1 & 3, (?) 2 and not pl. 9, figs. 6.
1931. *Trigonia naumanni* YEHARA, Trigoniae in Japan, p. 21, 2 text-figs.
1952. *Nipponitrigonia naumanni* COX, *Proc. Mal. Soc. London, Vol. 29*, p. 53.

Similar to *N. kikuchiana* except 14 or more concentric costae which are arranged densely in the anterior, tending more widely spaced and disappear in the middle and posterior parts. Because the Katsuragawa specimen in

fig. 1, pl. 11 best agrees with his diagnosis, it must be the lectotype. He gave no mention of its exact locality in the Katsuragawa basin, but stated in a later paper (1925) that *naumanni* occurs at Taniguchi and Sakamoto in his upper Trigonian sandstone which belongs to the Hoji sandstone beds.

One of his Todai specimens (figs. 3a–b, pl. 11) which he once identified with *kikuchiana* (1921), is so much elongated that it is a question whether its unusual outline depends merely on the secondary deformation. His Ninomiya specimen (YEHARA, 1923, pl. 9, fig. 6) was referred to *sagawai* in his later paper (1927), but disagrees with *sagawai* in the distinct concentric sculpture. This looks like an *Astarte*.

Nutatsubo specimen (pl. 10, fig. 12) is small and longer than YEHARA's type. Its area is relatively large. Some 5 concentric costae near the umbo are very stout and do not die out before they reach the marginal angulation, but later ones are fairly obscure. Hagino specimen (pl. 10, fig. 13) is very similar to the preceding, but smaller. In its umbonal area there are three or four strong costae which are abruptly geniculated on the marginal carinae, forming an angle of 90 degrees or less. These two forms, though agree with *kikuchiana* in some features, closer to *naumanni*.

Occurrence:—Miyako series (Albio-Aptian) at Taniguchi and Sakamoto in Katsuragawa basin, Prov. Awa, Tokushima Pref., Hagino, Mirafu village and Nutatsubo of Nishitani, Shingai village in Ryoseki-Monobegawa basin, Prov. Tosa, Kochi Pref., Hirano and Sendatsuno near Ochi in Sakawa basin, Prov. Tosa and at Todai, Kami-Ina-gun, Prov. Shinano, Nagano Prefecture.

Nipponitrigonia convexa KOBAYASHI, new species

Plate 10, Figure 14; Plate 11, Figures 1–3, 4a–c.

1923. *Trigonia kikuchiana* YEHARA (pars), *Japan. Jour. Geol. Geogr., Vol. 2*, pl. 11, fig. 1, only.

This includes strongly convex forms of *Nipponitrigonia* whose umbones are fairly large and remarkably opistogyl; marginal angulation varies in prominence to a great extent; escutcheon small, ill-defined; surface smooth.

Goshonoura specimen (figs. 4a–c, pl. 11) once called *kikuchiana* by YEHARA, has an obtuse marginal carina; area very large and mesially depressed; escutcheon seemingly very small. The marginal angulation is also seen in the Moshi specimen (fig. 14, pl. 10). In the internal moulds from Miyanohara and Sendatsuno (figs. 2 and 3, pl. 11), however, there is no marginal carina. In the internal moulds from Yamanokami (fig. 1, pl. 11) a peculiar sharp ridge extends from umbo to the middle of the siphonal margin. Their umbones are slender, if compared with the precedings.

Occurrence:—Trigonian sandstones at Yamanokami of Nagano near Sakawa (lower Neocomian), Sendatsuno near Ochi (Neocomian) and Miyanohara (Cenomanian) in Sakawa basin, Prov. Tosa, Kochi Pref.; Miyako series (Aptio-Albian) at Moshi, near Miyako, Shimohei-gun, Prov. Rikuchu, Iwate Pref.; Trigonian sandstone (Cenomanian) of Goshonoura, Amakusa islands, Prov. Higo, Kumamoto Prefecture.

Nipponitrigonia sakamotoensis (YEHARA)

Plate 10, Figure 15; Plate 11, Figures 8a–b.

1921. *Trigonia sakamotoensis* YEHARA *Jour. Geol. Soc. Tokyo, Vol. 28*, p. 10, pl. 5, fig. 4.

1928. *Trigonia sakamotoensis* YEHARA, *Japan. Jour. Geol. Geogr., Vol. 2*, p. 82, pl. 8, fig. 4.
1954. *Nipponitrigonia sakamotoensis* KOBAYASHI, *Ibid, Vol. 25*, p. 77.

Description:—Shell ovately oblong, moderately convex; umbo medium in size; post-umbonal margin short, nearly straight, forming an obtuse angle with siphonal margin; escutcheon undefined; area not well marked antero-mesially. Costae concentric or sub-concentric, somewhat wavy and more than two in number, a few umbonal ones of which extend in whole breadth, but some others become evanescent on area.

Observation and comparison:—There is neither a marginal carina nor an angulation, but the boundary between the disk and area is well marked by an abrupt change of curvature. This is a rare form. An internal mould from Miyanohara (fig. 15, pl. 10) which shows Trigonian hinge teeth clearly coincides with YEHARA's type (figs. 8a–b, pl. 11) in outline and convexity of the shell, notably in the post-umbonal concavity which cannot be seen in other species of *Nipponitrigonia*. In clearing the shell concentric costae were recognized in this incomplete external mould.

The reference of this species to *Nipponitrigonia* is tentative, because this is not diagnostic in surface sculpture and some other features.

Occurrence:—Hoji sandstone of Miyako series (Albio-Aptian) at Sakamoto, in Katsuragawa basin, Prov. Awa, Tokushima Pref.; Miyanohara sandstone (Cenomanian) at Miyonohara in Sakawa basin, Prov. Tosa, Kochi Pref.

The Trend of Evolution in Trigonians

Posterior rostration or delation has taken place in various Trigonian groups. It is self-evident that *Prorotrigonia seranensis* (KRUMBECK) is not intimately related to *Trigonia culleni* LYCETT or *T. libanensis* KRUMBECK, though they are all rostrate. The pedigree attached to *Megatrigonia* or *Iotrigonia* is still different. These two genera are probably derivatives from the Vaugoniinae stock (KOBAYASHI, 1954).

While VAN HOEPEN erected the Rutitrigoniinae for *Rutitrigonia*, COX (1952) accepted *Iotrigonia*, *Rutitrigonia* and *Apiotrigonia* as subgenera of *Megatrigonia*. *Rutitrigonia* is, however, quite different from the three others in surface sculpture. At the same time it may be too far going to cut off such a terminal branch from the main stock simply by the rostration.

If emphasis is laid on the original sculpture in the non-rostrate part of the shell, it is certainly closer to the Trigoniinae than the Vaugoniinae. Therefore *Rutitrigonia* is considered probably a rostrate genus of the Trigoniinae.

Genus *Rutitrigonia* VAN HOEPEN

1929. *Rutitrigonia* VAN HOEPEN, *Pal. Nav. Nas. Mus. Blocmfontien, Vol. 1, Pt. 1*, p. 31.
1932. *Rutitrigonia* CRICKMAY, *Am. Jour. Sci., Vol. 24*, p. 461.
1949. *Rutitrigonia* COX, *Proc. Mal. Soc. London, Vol. 29*, p. 59.

Diagnosis:—Shell elongate, rostrate posteally, with large umbones; marginal carina very obtuse or well rounded; escutcheon ill-defined; area smooth except near umbo; costae on disk concentric or subconcentric, somewhat flexuous, frequently obsolete in posterior.

Type species:—*Rutitrigonia peregina* VAN HOEPEN.

Remarks:—As noted by CRICKMAY,

the type species is remarkably rostrated backward. Costae on the surface change from concentric to subconcentric and then become somewhat irregularly wavy. They are distinct even in the full grown stage, but transverse costellae on the area become evanescent.

Cox attributed the *excentrica* group of the Glabrae section to this genus. Among 20 forms which were enumarated as its members, 6 are Middle or Lower Cretaceous ones in Europe. They are *affinis* Sowerby, *coquandiana* d' Orbigny, *dunscombiensis* Lycett, *excentrica* Parkinson, *laeviuscula* Lycett and *longa* Agassiz. Among them the shell outline varies to a great extent. It is especially dilated posteally in *longa*. There is, however, no rostrate one like *peregina*. The costae in the mature stage are concordant with the pallial border in *affinis*, but become discordant in *laeviusculus*, *dunsdombiensis* and some others. They are somewhat undulated in the anterior, while they are evanescent in the posterior part. The abrupt and regular termination of the costae at a distance from the marginal carina is the typical aspect of *Laevitrigonia*. It is seen in *dunscombiensis*, although the carina is blunt and there is no ante-carinal sulcus.

It is certainly a remarkable fact on the conchontogeny that a very young form of *excentrica* illustrated by Lycett (pl. 20, fig. 6) possesses diagonal costellae on the area. It is quite allied to *Trigonia beesleyana* Lycett which is the monotypic species of *Psilotrigonia*.

As the *excentrica* group is used to be combined in the Glabrae or Laeves section with *Psilotrigonia* and *Laevitrigonia* or *gibbosa* group, they are intimately related to one another in one or another character. Judging from the regular plain costae which exist at least in the juvenile stage of the disk, it is certain that these groups were derived from

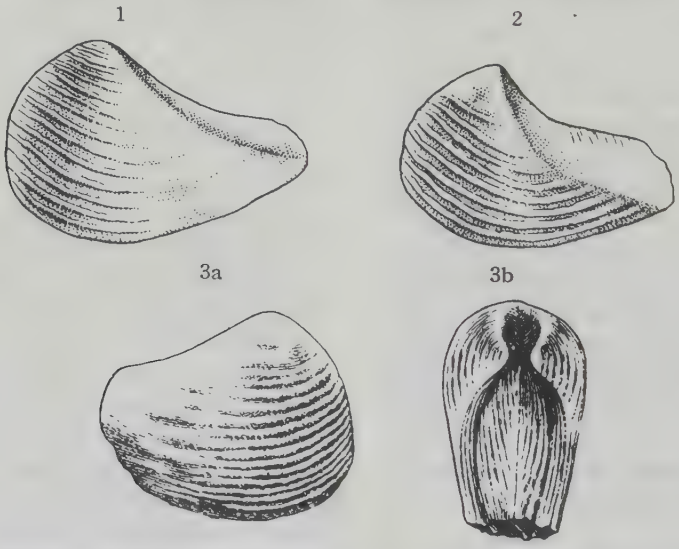


Figure 1. *Trigonia niongalensis* Lange in Krenkel, 1910, pl. 20, fig. 5.
Figure 2. *Trigonia dietrichi* Lange in Krenkel 1910, pl. 20, fig. 7.
Figures 3a-b. *Trigonia fortinensis* Lambert, 1944, pl. 4, figs. 4-6.
(All redrawn by S. Suzuki).

the Costatae stock from time to time.

According to COX, *Rutitrigonia* is well represented in the Tendaguru fauna of East Africa by 6 species, namely, *beyschlagi*, MÜLLER, *bernhardti* MÜLLER, *dietrichi* LANGE, *janenschi* LANGE, *uiongalensis* LANGE and *schwarzi* MÜLLER. *Trigonia janenschi* is an elongate form like *longa*, in which costae are abruptly effaced as in *Laevitrigonia*. *Trigonia semiculta* FORBES from the Senonian of Trichinopoly district, India, is also a laevitrigonioid without antecarinal sulcus.

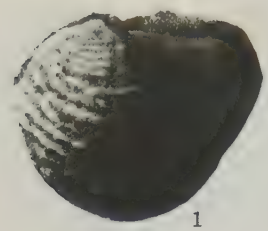
Especially interesting ones among the Tendaguru members are *dietrichi* and *niongalensis*. In the former the broad smooth area is clearly defined by a sharp marginal carina. Although it has no radial there, its general aspect strongly reminds one of *Trigonia celleni* LYCETT. Remarkably enough, the gradation in weakening of the carina, narrowing of the area and effacement of the costae are clearly seen through this sepcies and three illustrated forms of *niongalensis* (HENNING, 1914, pl. 20, figs. 3–6.)

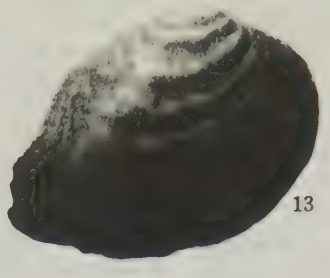
In *schwarzi* the costae are warped up in front of the umbo. Two different forms are called *beyschlagi* and the long one (KRENKEL, 1910, pl. 20, fig. 9) has

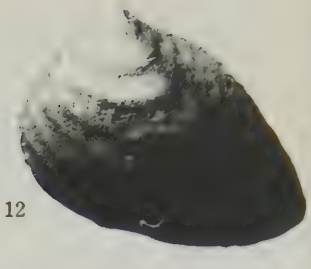
---

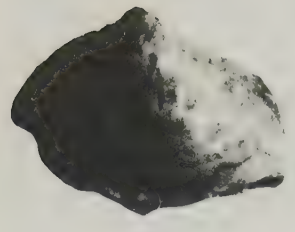
Explanation of Plate 10

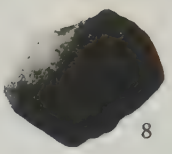
All of the specimens kept in Geol. Inst., Univ. of Tokyo, unless repository is cited.

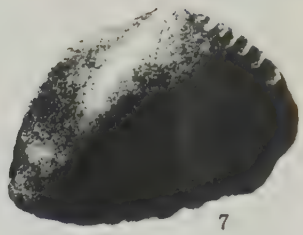

1

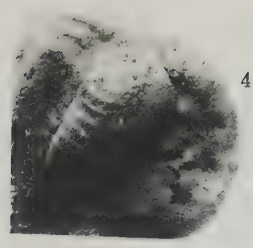

13

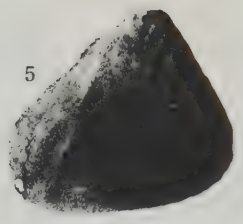

12

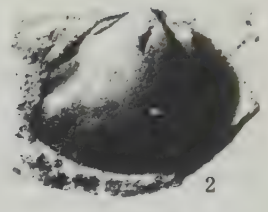

14

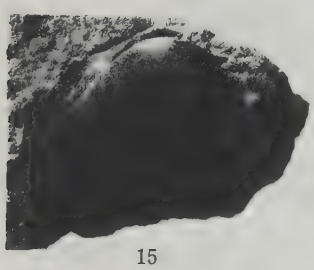

8

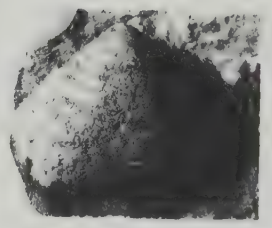

7

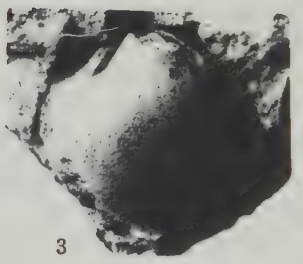

4


5

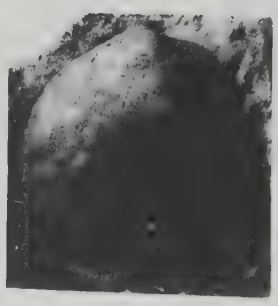

2

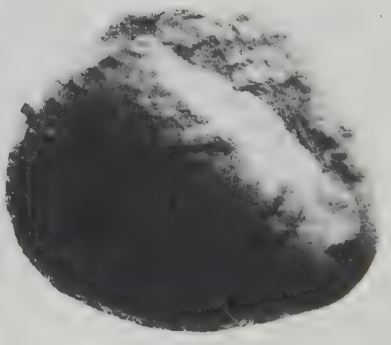

15


6


3


11


10


9

them slanting forward.

Among American species *longa* var. *undulatostriata* PAULCKE in Chili, *agrioensi* WEAVER in Neuquen, Argentina and *jacksonensis* PACKARD in Oregon are all rostrate forms with subhorizontal costae on the anterior part. The second species is quite similar to *peregrina* in outline, but costae are obsolete on the posterior side. The first one is also similar to the type species, instead of *longa*. It has a shallow, antecarinal sulcus as does *peregrina*, but costae are not numerous, short and wavy. It may be better to recognize *undulatostriata* as an independent species rather than a variety of *longa*. Slightly nodose costation of *jacksonensis* from the Chico group is an unusual feature in *Rutitrigonia* which appeared late in the Senonian epoch.

Trigonia fortinensis LAMBERT from the Neocomian of Neuquen has distinct radial costellae in the area, as it was located in the Costatae by the author. Nevertheless it is distinctly rostrate and concentric costae die out in the posterior of the disk. Therefore it looks a typical *Rutitrigonia* in the lateral view. It is certainly closer to *Rutitrigonia* than *Trigonia celleni* from British Interior Oolite. In fact it is a *Rutitrigonia*, if the radials are effaced.

It is known in some *Rutitrigoniae* that the concentrics near the umbo run into the area from the disk. Furthermore *fortinensis* and *dietrichi* are Neocomian species of the genus. Therefore they are not ancestral to *Rutitrigonia*. It can, however, hardly be overlooked that they constitute a fairly continuous morphic series with *niongalensis*.

It is difficult to decipher the history of phylogeny, especially in the case of obsolete forms among which morphic convergence took place. It is noteworthy that in Europe there is no rostrate form as typified by *peregona*. Because *excentrica* passes the *Psilotrigonia* stage in its juvenalium, it may not be a direct derivative from *Trigonia*, s. str. Therefore the *excentrica* group, s. str. typified by *Trigonia excentrica* should be separated from *Rutitrigonia*. In the *excentrica* group, s. str. which was most developed in Europe the umbo is small and the outline trigonally ovate and dilates posteally. It is fairly high in *excentrica* (pl. 21, fig. 7, LYCETT).

Rutitrigonia, s. str. has a rostrate shell with a large umbo probably due to swelling of the animal in the juvenile stage. The costae frequently become obsolete on the posterior side. Simultaneously, the costae happened to be warped up or even angulated. It may be attributed to the migration of the anterior undulation which usually exists on the costae of *Trigonia* or *Frenguelliella*. The transverse or horizontal costae on the contrary may be introduced by elongation of the undulation possibly in accordance with the rostration. The costae are, though sometimes a little flexuous, as a rule plain. The nodose ones appear only at the terminus of the *Rutitrigonia* branch.

Distribution:— World-wide; Cretaceous. Most developed in Neocomian in the Indo-Pacific province.

Rutitrigonia yeharai KOBAYASHI

Plate 10, Figure 1.

1923. *Trigonia neumayri* YEHARA, non CHOFFAT, *Japan. Jour. Geol. Geogr., Vol. 2*, p. 82, pl. 9, figs. 1-3.
1952. *Rutitrigonia neumayri* COX, *Proc. Mal. Soc. London, Vol. 29*, p. 59.
1954. *Rutitrigonia yeharai* KOBAYASHI, *Japan. Jour. Geol. Geogr., Vol. 25*, p. 74.

Description:—Shell small, subelliptical, elongate posteally, moderately convex; umbo fairly large, antero-mesial and elevated above hinge margin; ante-umbonal margin straight and slant; post-umbonal long, straight and subhorizontal; remainder of outline broadly rounded. Area and escutcheon scarcely defined, more or less flat and smooth, but costellate near umbo. Concentric costae fine, distinct in non-rostrate part and obtusely angulated near anterior margin. They are crowded on umbo, but intercostal space becomes wider through growth.

Observation:—On a specimen it is seen that concentric costae extend from the disk into the area where they are interrupted by the median furrow. YEHARA's specimen in fig. 1 on pl. 9, reveals an obtuse angulation of the costae, but in a specimen at hand they are undulated, instead of angulated, in the anterior part of the disk. A shallow antecarinal depression is discernible in this specimen. In the collection at hand there is an imperfect left valve, 4.5 mm. high and 6 mm. long. If complete, it is presumably more than 8 cm. long.

Comparison:—*Trigonia agrioensis* WEAVER has a very large umbo; its rostrate part is much broader in this than in the Argentine species. *Trigonia jacksonensis* PACKARD has also a large umbo and its costae somewhat nodose. This species is similar to *Rutitrigonia peregrina* VAN HOEPEN in outline, but in that species the posterior outline is longer; costae, though extended longer backward, become evanescent on the area; escutcheon clearly defined.

Occurrence:—Trigonian sandstone (lower Neocomian) at Yamanokami of Nagano in the Sakawa basin, Prov. Tosa, Kochi Prefecture, accompanied by *Nipponitrigonia kikuchiana*, *N. convexa* and *Pterotrigonia "pocilliformis"*.

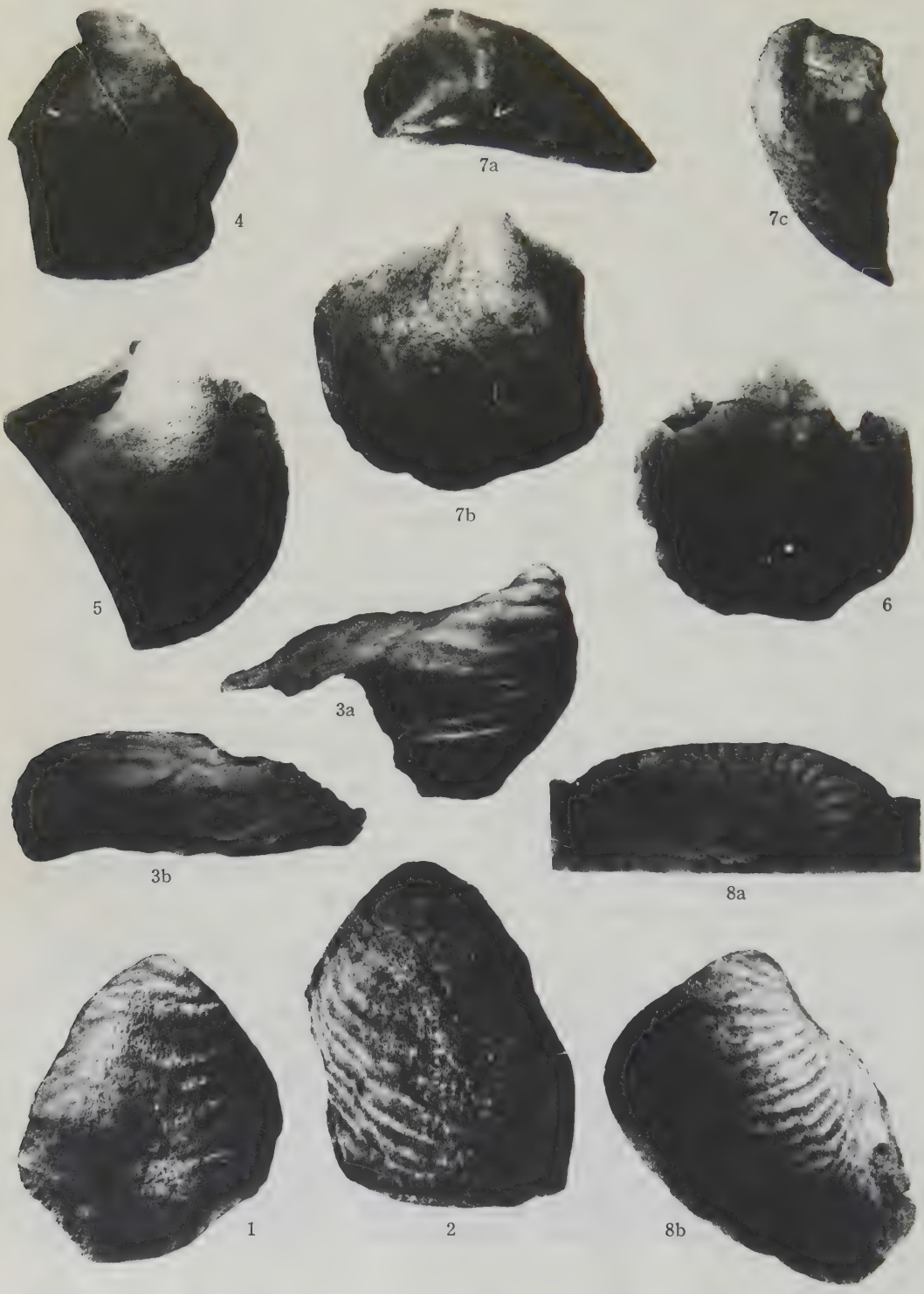
Explanation of Plate 11

Nipponitrigonia naumanni (YAHARA) ..... p. 54
Figure 1. Right valve; natural size; Katsuragawa basin, Prov. Awa.
Figure 2. Left valve; nat. size; Todai, Kami-Ina-gun, Prov. Shinano.
YEHARA's types, kept Geol. Inst., Kyoto Univ.

Nipponitrigonia cfr. *naumanni* (YEHARA) ..... p. 55
Figures 3a-b. Lateral and umbonal views of a right valve; natural size; Todai, Kami-Ina-gun, Shinano.
YEHARA's type, kept in Geol. Inst., Kyoto Univ.

Nipponitrigonia convexa KOBAYASHI, new species ..... p. 55
Figure 4. Right valve; nat. size; Trigonian sandstone at Yamanokami of Nagano, Sakawa basin, Tosa.
Figure 5. Right valve; nat. size; Sendatsuno, west of Ochi, Sakawa basin, Tosa.
Figure 6. Left valve; nat. size; Miyanohara, east of Ochi, Sakawa basin, Tosa.
The three specimens kept in Geol. Inst., Univ. of Tokyo.
Figures 7a-c. Umbonal, lateral and posterior views of a left valve; nat. size; Goshonoura-shima, Amakusa islands, Prov. Higo.
YEHARA's type, kept in Geol. Inst., Kyoto Univ.

Nipponitrigonia sakamotoensis (YEHARA) ..... p. 55
Figures 9a-b. Umbonal and lateral views of a left valve; nat. size; Sakamoto village, Katsuragawa basin, Prov. Awa, Tokushima Pref.
YEHARA's type kept in Geol. Inst., Kyoto Univ.


4
7a
7c
7b
5
6
3a
3b
8a
1
2
8b

Reference

AGASSIZ, L. (1840), Études critiques sur les Mollusques fossiles. Mém. sur les Trigonies.

BIGOT, A. (1893), Contribution à l'étude de la faune jurassique de Normandie, 1. Sur les Trigonies. *Mém. Soc. Linn. Normandie, Vol. 17.*

COX, L. R. (1952), Notes on the Trigoniidae with Outline of a Classification of the Family. *Proc. Mal. Soc. London, Vol. 29.*

CRICKMAY, C. H. (1932), Contribution towards a Monograph of the Trigoniidae. *Am. Jour. Sci., Vol. 24.*

DEECKE, W. (1925), Trigoniidae mesozoicae (*Myophoria* exclusiva). *Fossilium Catalogus, Animalia, Pars 30.*

DIETRICH, W. O. (1933), Zur Stratigraphie und Palaeontogie der Tendaguru-Schichten. *Palaeontogr., Suppl. 7, Ser. 2.*

HENNIG, E. (1919), Die Invertebraten-Fauna der Saugetierschichten am Tendaguru. *Archiv. für Biontologie, 3te Bd, 4te Hft.*

VAN HOEPEN, E. C. M. (1929), Die Krytfauna von Soeloeland, 1. Trigoniidae. *Pal. Navorsing Nas. Mus. Bloemfontien, Vol. 1, Pt. 1.*

KOBAYASHI, T. (1954), Studies on the Jurassic Trigonians in Japan. Pt. 1, Preliminary Notes. *Japan. Jour. Geol. Geogr., Vol. 25.*

—— and AMANO, M. (1955), On the Pseudoquadratae Trigonians, *Steinmannella*, in the Indo-Pacific Province. *Ibid., Vol. 27.*

—— and MORI, K. (1954), *Prosogyrotrigonia* and the Trigoniinae. Studies Op. cit. Pt. 2. *Ibid., Vol. 25.*

—— and —— (1955), The Vaugoniinae from the Kitakami Mountains in North Japan. Op. cit. Pt. 3. *Ibid., Vol. 26.*

KRENKEL, E. (1910), Die Untere Kreide von Deutsch-Ostafrika. *Beitr. zur Pal. u. Geol. Oesterreich-Ungarns u. des Orients, Bd. 18.*

KRUMBECK, L. (1905). Die Brachiopoden- und Mollusken-fauna des Glandarinekalkes. *Ibid., Bd. 18.*

—— (1923), Brachiopoden, Lamellibranchiaten und Gastropoden aus der oberen Trias der Insel Seran (Mittle-Seran). *Palaeontogr., Suppl. 4, Th. 3.*

LAMBERT, L. R. (1944). Algunas *Trigonias* del Neuquen. *Rev. del Mus. de La Plata, N S., Tom 2, Pal., No. 14.*

LYCETT, J (1872-79), A Monograph of the British Fossil *Trigoniae. Pal. Soc.*

MATSUMOTO, T. et al. (1954), The Cretaceous System in the Japanese Islands. *Japan. Soc. Prom. Sci. Tokyo.*

D'ORBIGNY, A. (1843), Paléontologie française. Terrain Cretacés, *Vol. 3*, Paris.

PACKARD, E. L. (1921), The *Trigoniae* from the Pacific Coast of North America. *Univ. Oregon Publ. Vol., 1, No. 9.*

PAULCKE, W. (1903), Ueber der Kreideformation in Südamerika und ihre Beziehungen zu anderen Gebieten. *Neues Jahrb. für Min. 17 Beil.-Bd.*

STOLICZKA, F. (1871), Cretaceous Fauna of Southern India. The Pelecypoda with a Review of all known Genera of this Class, fossil and recent. *Pal. Indica, Ser. 6, Vol. 3.*

YEHARA, S. (1915), Cretaceous *Trigoniae* from Miyako and Hokkaido. *Sci. Rep. Tohoku Imp. Univ. Sendai, 2d Ser. Vol. 2.*

—— (1921). On some new Species of *Trigonia* from the Lias of Prov. of Nagato and the Cretaceous of Prov. Awa. *Jour. Geol. Soc. Tokyo, Vol. 28.*

—— (1923), Cretaceous *Trigoniae* from Amakusa Island, Prov. Higo, Kyushu, Japan. *Ibid., Vol. 30.*

—— (1923), Cretaceous *Trigoniae* from Southwestern Japan. *Japan. Jour. Geol. Geogr., Vol. 2.*

—— (1925), On the *Trigonia* sandstone Group in the Katsuragawa Basin containing Ryoseki Plants. *Ibid. Vol. 3.*

—— (1922), Faunal and Stratigraphical Study of the Sakawa Basin, Shikoku. *Ibid., Vol. 5.*

—— (1931), *Trigoniae* in Japan. *Iwanami Lecture Series. Geology and Palaeontology.*

YOKOYAMA, M. (1881), On some Cretaceous Fossils from Shikoku. *Jour. Coll. Sci. Imp. Univ. Tokyo, Vol. 4, Pt. 2.*

PUBLICATIONS RECEIVED (17)

1277. Nav. Res. Nasion. Mus., Vol. 1, pt. 9, 1956.
1278. Quart. Jour. Geol. Soc. London, Vol. 112, No. 445, 1956.
1279. Investigações Químico-Analíticas IV, Dep. Nacio. Prod. Min., Bolt. 34, 1949.
1280. Investigações Físico-Químicas (II), Ibid., Bolt. 35, 1949.
1281. Ferreira, E. O.: Determinação do gráo de liberação dos minerais, por meio da platina integradora de Shand. Dep. Nacio. Prod. Min., Avul. 9, 1950.
1282. De Araújo, J. B.: Carvão Vegetal para Alto-Forno, Dep. Nacio. Prod. Min., Bolt. 36, 1952.
1283. Da Silva Pinto, M.: A Soda Electrolítica e a Produçao do Fosfato Decalcico, Ibid., 37, 1954.
1284. Časopis Moravského Musea v Brné (Acata Musei Moraviae) XXXIV, 1949.
1285. Ibid. XXXV, 1950.
1286. Ibid. XXXIX, 1954.
1287. Ibid. XL, 1955.
1288. Časopis Zemského Musea v Brné. Část Priorodovedna svazek XXXII, 1948.
1289. Časopis Moravského Musea v Brné XXXVI, 1951.
1290. Ibid. XLI, 1956.
1291. Součková, M.: Prispevek k poznani rzi a sneti v Československu, Act. Mus. Mor., XXXIX, 1954.
1292. Stehlik, J. L.: Prispevek k poznanni Pterygopolymorfismu u Heteropter, Acta Mus. Mor., XXXIX, 1954.
1293. Sterba, O.: *Bathynella chappnisi* Delachaux a jini Korýši Brnénských Studni, Act. Mus. Mor. XXXIX, 1954.
1294. Emerson, W. K.: Upwelling and Associated Marine Life along Pacific Baja California, Mexico, Jour. Pal., Vol. 30, No. 2, 1956.
1295. Fabrino, A. D.: Aspectos da Crenoterapia na Europa e no Brasil, Dep. Nac. Prod. Min. Com. Peran. Crenol. Publ. No. 1, 1949.
1926. Lopes, R. S.: Aguas Minerais do Brasil, Ibid., Publ. No. 2, 1956.
1297. Cooper, G. A.: Chazyan and Related Brachiopods; Pt. I, Text, Smith. Misc. Coll. Vol. 127, pt. 1, 1956.
1298. Ibid, Pt. II, Plates.
1299. Barnes, V. E.: Lead Deposits in the Upper Cambrian of Central Texas. Bureau of Ec. Geol, Univ. Texas, Rep. Invest. No. 26, 1956.
1300. Myers, D. A., P. T. Stafford, R. J. Burnside: Geology of the Late Paleozoic Horseshore Atoll in West Texas, Publ. No. 5607, 1956.
1301. Časopis Moravského Musea v Brné (Acta Musei Moraviae) XXXVII, 1952.
1302. Ibid. XXXVIII, 1953.
1303. Černý, P.: Titanit z Pegmatitu u Věžné: Ibid. XXXIX, 1954.
1304. Jelinek, J.: Anthropologická pozorování z výzkumů na Cezanách u Blučiny, Okr. Židlochovice, Ibid. XXXIX, 1254.
1305. Krufa, T.: Přispěvky k Moravské Topografické Mineralogii. Ibid. XXXIX, 1954.
1306. Kux, Z.: Hnizdéni Strnadů cia (Emberiza cia cia L.) a strnadů Šedohlavých (Emberiza cuesia ssp. n.?) v ČSR, Ibid. XXXIX, 1954.
1307. Kux, Z.: Přispěvek k Hniždní Biologii a Rozšiření Moudivláčkeí (Remiz pendulinus pendulinus (L.)) na Jizni Moravě: Ibid. XXXIX, 1954.
1308. Musil, R.: Nalez Kostry Mamuta v Ježově n Kyjova. Ibid. XXXIX, 1954.
1309. Nečesaný, V.: Botanický Rozbor věteřovsko-Velatichého Hradistě na Cezavách u Blučiny, Ibid. XXXIX, 1954.
1310. Pokorný, M.: Kvartér v Oblasti Šumbark-Albrechtice-Horní Térlicko-Prostredni Bludovice, Ibid. XXXIX, 1954.
1311. Pokorný, M.: Geologicke Pomery Jižné od Drahan, Ibid., XXXIX, 1954.

Trans. Proc. Palaeont. Soc. Japan, N.S., No. 26, pp. 63-68, June 15, 1957

315. PALAEOGENE FORAMINIFERA FROM KONBUMORI, EASTERN HOKKAIDO, JAPAN*

SABURO YOSHIDA

Institute of Geology, Kushiro Branch, Hokkaido Gakugei University.

東部北海道釧路国昆布森附近の古第三系より産する有孔虫について：昆布森字宿徳内附近には，舌辛層が発達していて，これから産した有孔虫について報告する。また *Virgulina*, *Nonion* の 2 新種および *Nonion*, *Cyclammina* の 2 新変種を記載した。 吉田三郎

Introduction

Palaeogene Foraminifera from Eastern Hokkaido was first recorded by K. Asano (1952) who reported on the samples collected from the Shitakara formation in Akan-mura and Kushiro City. The writer found new materials from the same formation at Syukutokunai, Konbumori-mura, near Kushiro City, (Lat. 42°56′37″N., Long. 144°30′44″E.), where the formation may be subdivided into two members: namely, the upper member consists of dark greyish silt and calcareous marls, containing several species of Foraminifera described here, while the lower one mainly consists of light greyish medium sandstone. The writer considers that the upper member may be correlated to the middle part of the Shitakara formation of the type-area.

Acknowledgements

The writer wishes to express his sincere thanks to Professors Kiyoshi Asano and Kotora Hatai, Tohoku University, for their kindly reading the present manuscript. Acknowledgements are also due to Professor Haruyoshi Fujimoto, Messrs. Y. Fujita and H. Ujiie of the Tokyo University of Education, and Mr. Y. Takayanagi of the Tohoku University for their encouragement.

Systematic Description

Family Cassidulinidae

Genus *Cassidulina* d'Orbigny, 1826

Cassidulina margareta Karrer

Text-figs. 1, 2.

Cassidulina margareta Karrer, 1877, *K. K. Geol. Reichs. Abh., Wien, Bd. 9*, p. 386, pl. 166, fig. 52.

Cassidulina margareta Cushman, 1925, *Contr. Cushman Lab. Foram. Res., vol. I, pt. 3*, p. 56, pl. 9, figs. 29, 30.

Cassidulina margareta Cushman and Laiming, 1931, *Journ. Paleont., vol. 5*, p. 116, pl. 13, figs. 7a-c.

Cassidulina margareta Cushman and Parker, 1931, *Contr. Cushman Lab. Foram. Res., vol. 7, pt. I*, p. 15, pl. 2, figs. 13a, b.

Cassidulina margareta Kleinpell, 1938, *Amer. Assoc. Petr. Geol.*, pp. 333-334, pl. 8, fig. 10.

Cassidulina margareta Asano, 1953, *Short Papers, IGPS, no. 5*, pl. 3, figs. 11a, b.

The writer found this form from the Shitakara formation in the test boring well at Otanoshike, Kushiro City.

* Read Oct. 29, 1955; received Sept. 29, 1956.

Locality:—Syukutokunai, Konbumori, Kushiro, Eastern Hokkaido.

Depository:—Hokkaido Gakugei University, Kushiro City. Reg. No. 561250.

Family Lagenidae

Genus *Pseudoglandulina* Cushman, 1929

Pseudoglandulina obtusissima (Reuss)

Text-figs. 3, 4, 5, 6, 7, 8, 9.

Glandulina obtusissima Reuss, 1863, *K. Akad. Wiss., Nath.-Naturw. Cl., Bd. 48, Abt. I*, p. 66, pl. 8, figs. 92, 93.

Description:—Test elongate, circular in transverse section, with all the chambers in a rectilinear series; wall calcareous, perforate; chambers few, embracing, rapidly increasing in width as added, last formed one making up one half or more of the whole test; aperture circular.

Dimensions:—Length 0.55 mm., width 0.35 mm. (figs. 3, 4, 5), ratio of length to width 0.95 : 0.45 (fig. 6); 1.20 : 0.70 (fig. 7); 0.90 : 0.50 (fig. 8); 0.45 : 0.30 (fig. 9).

Remarks:—The present specimens seem to be identical to the species figured by Reuss. This form also resembles *P. clarkei* Parr which was described from the Upper Eocene of Western Australia, but differs from it in the more distinct and overlapping chambers. This species also differs from *P. turbinata* Detling in the broadly rounded initial end, and is distinguished from *P. conica* (Neugeboren) by the few numbers of chambers and general outline of the test.

Locality:—Syukutokunai, Konbumori, Kushiro, Eastern Hokkaido.

Depository:—Hokkaido Gakugei University, Kushiro City. Reg. Nos. 561251, 561252, 561253, 561254, 561255.

Family Buliminidae

Genus *Virgulina* d'Orbigny, 1826

Virgulina kushiroensis Yoshida n. sp.

Text-figs. 10, 11.

Description:—Test elongate, tapering, compressed, early portion twisted, later biserial; chambers elongate, overlapping, inflated, often with a distinct spine at periphery; suture distinct, steeply inclined, depressed; wall smooth, finely perforate; aperture indistinct. Length up to 0.3 m.

Remarks:—This form resembles somewhat *V. keijzeri* Hermes which was described from Cuba and *V. spinulosa* Hussey which was described from the Eocene of Louisiana, but differs from them in much elongate chambers.

Types and Depository:—Holotype from the Sea Cliff at Konbumori, Kushiro, Eastern Hokkaido. Middle Shitakara formation. Hokkaido Gakugei University, Kushiro City. Reg. No. 561256.

Genus *Bolivina* d'Orbigny, 1839

Bolivina kleinpelli Beck

Text-figs. 12, 13.

Bolivina kleinpelli Beck, 1943, *Journ. Paleont., vol. 17*, p. 606, pl. 107, fig. 39.

Description:—Test small, compressed, slightly tapering, semiacute initial end, periphery sharp; chambers numerous, somewhat inflated; sutures slightly depressed, sinuated; wall ornamented with coarse pores; aperture elongate. Length up to 0.35 mm.

Locality:—Syukutokunai, Konbumori, Kushiro, Eastern Hokkaido.

Depository:—Hokkaido Gakugei University, Kushiro City. Reg. No. 561260.

Family Nonionidae

Genus *Nonion* Montfort, 1808

Nonion kushiroense Yoshida, n. sp.

Text-figs. 14, 15.

Description:—Test circular or subcircular in side view, periphery broadly rounded, slightly lobulate; 8 indistinct chambers in last whorl; umbilical region slightly depressed; sutures gently curved, not limbate, deeply depressed toward the umbilicus, usually indistinct near periphery; wall smooth, finely perforate; aperture narrow at base of apertural face. Diameter up to 0.3 mm.

Remarks:—Differs from *N. dingdeni* Cushman which was described from the Miocene of Dingden, Germany in the broadly rounded peripheral margin, and smooth umbilical region.

Types and Depository:—Holotype from the Sea Cliff at Konbumori, Kushiro, Eastern Hokkaido. Middle Shitakara formation. Hokkaido Gakugei University, Kushiro City. Reg. No. 561257.

Nonion sorachiense Asano var.

konbumoriense Yoshida, n. var.

Text-figs. 16, 17.

Description:—Test small, periphery broadly rounded, lobulate; chambers inflated, 8 in adult coil; umbilical region depressed, without granular shell material; sutures nearly straight, septal pores indistinct; aperture indistinct. Diameter up to 0.47 mm.

Remarks:—Differs from *N. sorachiense* Asano in the straight sutures and symmetrical test.

Types and Depository:—Holotype from the Sea Cliff at Konbumori, Kushiro, Eastern Hokkaido. Middle Shitakara formation. Hokkaido Gakugei University, Kushiro City. Reg. No. 561258.

Family Lituolidae

Genus *Cyclammina* H. B. Brady, 1879

Cyclammina pacifica Beck var.

kushiroensis Yoshida, n. var.

Text-figs. 18, 19.

Description:—Test oval, much compressed, involute, periphery subacute, angled, slightly lobulate; chambers numerous, usually 10–12 in last whorl, somewhat irregular in size; sutures distinct, nearly radial, slightly compressed; wall finely arenaceous, smoothly finished; aperture a curved slit at the base of apertural face, supplementary pores indistinct. Diameter up to 1.0 mm.

Remarks:—This form differs from *C. pacifica* Beck by the much compressed test. It was found by the writer from the Shitakara formation at Konbumori and Otanoshike, Kushiro City.

Types and Depository:—Holotype from the Sea Cliff at Konbumori, Kushiro, Eastern Hokkaido. Middle Shitakara formation. Hokkaido Gakugei University, Kushiro City. Reg. No. 561259.

Cyclammina pacifica Beck

Text-figs. 20, 21.

Cyclammina pacifica Beck, 1943, ***Journ. Paleont., vol. 17, no. 6***, p. 591, pl. 98, figs. 2, 3.

Cyclammina pacifica Detling, 1946, ***Journ. Paleont., vol. 20***, pp. 351–352, pl. 46, figs. 1a, b.

Cyclammina pacifica Asano, 1951, ***Illustr. Cat. Jap. Tert. Small. Foram., pt. 10***, p. 7, text-figs. 24, 25.

Cyclammina pacifica Asano, 1952, ***Short Papers, IGPS, no. 4***, p. 33, pl. 3, figs. 1a, b; pl. 5, figs. 11a, b.

This form was found by the writer from the Shitakara formation in the

test boring well at Otanoshike, Kushiro City.

Family Lagenidae

Genus *Entosolenia* Ehrenberg, 1819

Entosolenia aff. *vasiformis* Hussey

Text-fig. 22.

Entosolenia vasiformis Hussey, 1949, ***Journ. Paleont., vol. 23***, p. 133, pl. 27, fig. 9.

Description:—Test compressed, semicircular in front view, apertural end bluntly pointed; wall smooth, bordered by a slight keel; aperture entosolenian. Width up to 0.3 mm.

Remarks:—This form resembles the species described from the Eocene of Louisiana Cane River by Hussey, but more specimens are needed to give a specific name definitely.

Family Polymorphinidae

Genus *Guttulina* d'Orbigny, 1839

Guttulina cf. *varians* (Terquem)

Text-figs. 23, 24.

Globulina varians Terquem, 1882, ***Soc. Géol. France, Mém., ser. 3, tome 2, no. 3***, p. 128, pl. 13, figs. 9–16.

Description:—Test ovate, acute at the apertural end, periphery rounded, chambers few, usually two, elongate; sutures distinct, not depressed, oblique; wall smooth; aperture radiate, pointed. Length up to 0.34 mm., width 0.15 mm.

Remarks:—Only a single specimen is found. This form seems to be almost identical with Terquem's figure 14.

Guttulina cf. *adhaerens* (Olszewski)

Text-fig. 25.

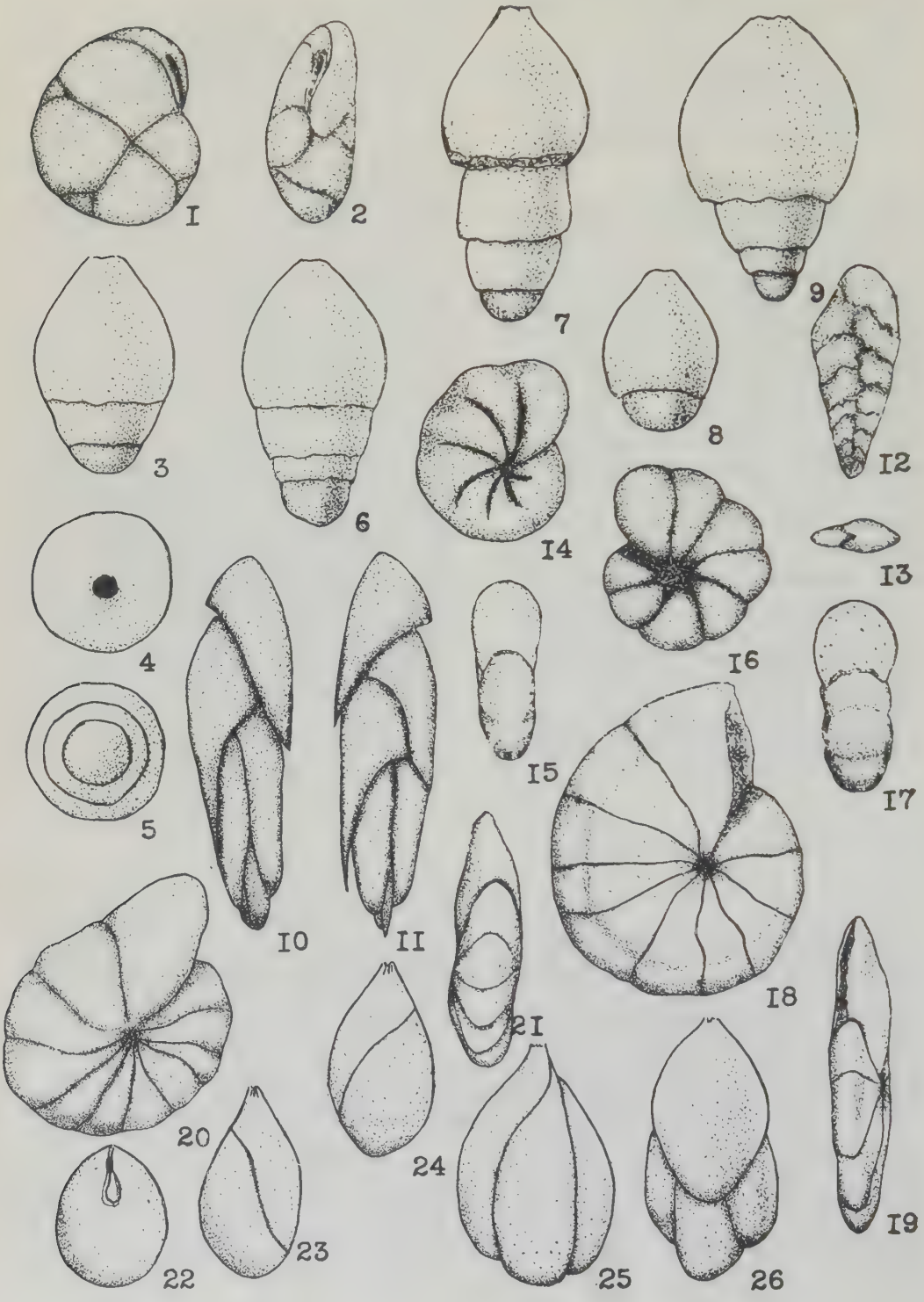
Polymorphina adhaerens Olszewski, 1875 ***Akad. Umiej. Krakowie, vol. 9***, p. 119, pl. 1, fig. 11.

Description:—Test ovate in side view, acute at the apertural end, broadly pointed at initial end; composed of three elongate, highly inflated chambers, each succeeding one extending to base of test; sutures distinct, depressed; wall smooth; aperture radiate. Length up to 0.1 mm.

Remarks:—This form seems to be almost identical with the one figured by Olszewski. But only a single specimen is found, and thus it is difficult to determine it definitely.

Explanation of Text-Figures

Figs. 1, 2. ***Cassidulina margareta*** Karrer. ×85.
Figs. 3, 4, 5, 6, 7, 8, 9. ***Pseudoglandulina obtusissima*** (Reuss, 1863). Figs. 3, 4, 5. ×40, 6. ×45, 7. ×47, 8. ×56, 9. ×39.
Figs. 10, 11. ***Virgulina kushiroensis*** Yoshida, n. sp. Holotype. ×51.
Figs. 12, 13. ***Bolivina kleinpelli*** Beck. ×91.
Figs. 14, 15. ***Nonion kushiroense*** Yoshida, n. sp. Holotype. ×76.
Figs. 16, 17. ***N. sorachiense*** Asano, var. ***konbumoriense*** Yoshida, n. var. Holotype. ×53.
Figs. 18, 19. ***Cyclammina pacifica*** Beck, var. ***kushiroensis*** Yoshida, n. var. Holotype. ×38.
Figs. 20, 21. ***C. p.*** Beck. ×29.
Fig. 22. ***Entosolenia*** aff. ***vasiformis*** Hussey. ×53.
Figs. 23, 24. ***Guttulina*** cf. ***varians*** (Terquem, 1882). ×10.
Fig. 25. ***G.*** cf. ***adhaerens*** (Olszewski, 1875). ×53.
Fig. 26. ***G.*** cf. ***problema*** (d'Orbigny, 1826). ×35.


1
2
7
9
3
6
8
12
14
4
13
16
5
15
17
10
11
18
21
20
24
19
22
23
25
26

Guttulina cf. *problema* (D'ORBIGNY)

Text-fig. 26.

Polymorphina problema D'ORBIGNY, 1826, *Ann. Sci. Nat., sér. I, tome 7*, p. 266.

Description:—Test broadly fusiform, somewhat irregular in outline; chambers strongly inflated, arranged in a sigmoid series; sutures distinct, depressed; wall smooth; aperture radiate. Length up to 1.1 mm.

Remarks:—This form resembles the one figured by D'ORBIGNY. However, only a single specimen is found, and more specimens are needed to give it a definite specific name.

References

ASANO, K. (1951), Recent and Tertiary *Cyclammina* from Japan and the Adjacent Regions: ***Short Papers, IGPS, no. 3***, pp. 13–24.

—— (1952), Palaeogene Foraminifera from the Ishikari and Kushiro Coal-Field, Hokkaido: ***Short Papers, IGPS, no. 4***, pp. 23–46, pls. 3–5.

—— (1950–1952), ***Illustrated Catalogue of Japanese Tertiary Smaller Foraminifera: Parts 1–15 and Supplement I.***

—— (1953), Miocene Foraminifera from the Noto Peninsula, Ishikawa Prefecture: ***Short Papers, IGPS, no. 5***, pp. 1–21, pls. 1–3.

—— (1954), Foraminiferal Sequence in the Paleo-Ishikari Sea, Hokkaido, Japan (in Japanese, English abstract and Description of New Species): ***Journ. Geol. Soc. Japan, vol. LX, no. 701***, pp. 43–49, text-figs. 1–5.

BECK, R. S. (1943), Eocene Foraminifera from the Cowlitz River, Lewis County, Washington: ***Journ. Paleont., vol. 17***, pp. 584–614, pls. 98–109.

CUSHMAN, J. A. (1925), Notes on the Genus ***Cassidulina: Contr. Cushman Lab. Foram. Res., vol. I, pt. 3***, pp. 51–59, pls. 8, 9.

CUSHMAN, J. A. and LAIMING, B. (1931), Miocene Foraminifera from Los Sauces Creek, Ventura County, California: ***Journ. Paleont., vol. 5, no. 2***, pp. 79–120, pls. 9–14.

CUSHMAN, J. A. and PARKER, F. L. (1931), Miocene Foraminifera from the Temblor of the east side of the San Joaquin Valley, California: ***Contr. Cushman Lab. Foram. Res., vol. 7, pt. I***, pp. 1–16, pls. 1, 2.

DETLING, M. R. (1946), Foraminifera of the Coos Bay Lower Tertiary, Coos County, Oregon: ***Journ. Paleont., vol. 20***, pp. 348–361, pls. 46–51.

HUSSEY, K. M. (1949), Louisiana Cane River Eocene Foraminifera: ***Journ. Paleont., vol. 23***, pp. 109–144, pls. 25–29.

KLEINPELL, R. M. (1938), Miocene Stratigraphy of California: ***Amer. Assoc. Petr. Geol.***, pp. 1–450, pls. 1–22.

NAGAO, T. and SASA, Y. (1939), Preliminary Report on the Stratigraphy of the Coal Bearing Tertiary in Northern Part of Kusiro and Tokati Coal-field (in Japanese): ***Journ. Geol. Soc. Japan, vol. 46, no. 550***, pp. 392–394.

RAU, W. W. (1948), Foraminifera from the Miocene Astoria Formation in Southwestern Washington: ***Journ. Paleont., vol. 22***, pp. 774–782, pl. 119.

SASA, Y. (1940), Stratigraphy of the Tertiary Deposits in the Kushiro Coal Field and a Critical Review of the Opinions Expressed (in Japanese): ***Journ. Hokkaido Coal Min. Assoc., no. 307***, pp. 1–19; ***no. 308***, pp. 20–43.

YOSHIDA, S. (1955), Paleogene Foraminifera from the Shitakara Formation Near Kushiro, Eastern Hokkaido: ***Journ. Hokkaido Gaku. Univ., vol. 6, no. 2***, pp. 1–8, pls. 1, 2.

Trans. Proc. Palaeont. Soc. Japan, N. S., No. 26, pp. 69-73, pl. 12, June 15, 1957

316. ON THE OCCURRENCE OF *CARDINIOIDES* FROM THE LIASSIC KURUMA GROUP IN CENTRAL JAPAN*

(Studies on the Liassic Pelecypods in Japan, 3)

ITARU HAYAMI

Geological Institute, University of Tokyo.

ライアス来馬層群産の二枚貝 *Cardinioides*：本属の産出は従来カーニックの日置層に限られていたが，来馬層群の模式地附近と他一ケ所から多産することが判つた。　速水　格

Cardinioides was established for three Carnic species by Kobayashi and Ichikawa (1952). It seems undoubtedly a distinct genus of Schizodonta. Its occurrence has hitherto been restricted to the Heki formation in Kyoto Pref., but now three Liassic species are found as follows:—

Cardinioides varidus Hayami, n. sp.
Cardinioides ovatus Hayami, n. sp.
Cardinioides (?) sp. indet.

Formerly Kobayashi (1935, MS) pointed out that there was a *Cardinia*-like right valve in his collection from a fossiliferous sandstone at Kuruma in Nagano Pref. In 1955 the writer surveyed this district, and the collection was greatly amplified. The *Cardinia*-like species, i. e. *Cardinioides varidus*, occurs together with some pectinids, bakevelliids, *Mytilus*, *Eomiodon* and *Protocardia*. The species of the last three genera are most abundant in the Shinatani formation of the Kuruma group in Niigata and Toyama Prefs., whose age is either Domerian or Toarcian as indicated by ammonites. (Sato, 1955; Kobayashi and others, 1957). *Cardinioides ovatus* is common in mudstones at Ohishi and at the mouth of Yogura-valley in Itoigawa City, Niigata Pref., and these shell-beds can be correlated to the Middle or Lower Liassic Kitamatadani formation by the assemblage.

The Iwamuro formation, also Liassic, contains similar pelecypods including an indeterminable species probably of this genus.

In the present study, the writer is much indebted to Prof. T. Kobayashi of the University of Tokyo who gave the writer constant advice and encouragement and who transferred his collection and manuscript to the writer.

Family Cardiniidae Zittel

This genus is referred to the Cardiniidae tentatively owing to its similarities in adductor-impressions, posterior lateral tooth and general outline to *Cardinia* and in the position of cardinal teeth to *Pachycardia* and *Trigonodus*.

Genus *Cardinioides* Kobayashi and Ichikawa, 1952.

Type species:—*Cardinioides japonicus* Kobayashi and Ichikawa (1952), Carnic.

Diagnosis:—Shell equivalve, inequilateral, subtrigonal to elliptical, thick,

* Read Oct. 6, 1956; received Oct. 22, 1956.

well inflated. Adductor scars strongly impressed; anterior one small, wedge-shaped, above which a small pedal retractor scar is often present; pallial line entire; ligament opisthodetic, external. Hinge structure fairly variable; a large trigonal pseudocardinal tooth of left valve usually carved vertically by several grooves; right valve having two teeth-like projections on both sides of pseudocardinal socket and often a ridge-like posterior lateral tooth of *Cardinia*-type; anterior lateral tooth absent. Surface smooth except for fine concentric lines of growth. Posterior carina becoming more distinct towards umbo, but sometimes absent; lunule and escutcheon absent.

Range:—Carnic to Liassic in Japan.

Remarks:—*Cardinioides* is distinct from related genera of Cardiniidae in outline and hinge-structure. *Cardinia* Agassiz (1841), from Upper Triassic to Middle Jurassic, is characterized also by thick test, strongly impressed adductor scars and short ridge-like posterior tooth above the posterior adductor scar. But *Cardinia* has not such a pseudocardinal tooth, as so well developed in *Cardinioides*; hinge area is fairly flattened except for a small, narrow cardinal tooth; shell usually less convex than in *Cardinioides*. Incidentally, *Thalassites* Quenstedt (1858) is a synonym of *Cardinia*.

Trigonodus Sandberger (1864) and *Pachycardia* Hauer (1857) differ from this genus not only in the more trigonal external aspect but also in having a more linearly elongated strong posterior lateral tooth and lunule. Although they are similar to this in the arrangement of cardinal teeth—two on the right, one on the left valve, the latter tooth is never carved by grooves as in *Cardinioides*.

Unio and *Palaeopharus* also possess pseudocardinal teeth but they are three in number—one on the right and two on the left valve (Kobayashi and Ichikawa, 1951), and their shells are much elongated and different in outline. Therefore their relation to this genus is not close.

Cardinioides can safely have two Kuruma species in its fold. The posterior lateral tooth is unknown in Heki specimens but well observed in *varidus* and *ovatus*. It is rounded, short, ridge-like and *Cardinia*-type. The elliptical or ovate outline of *ovatus* requires some emendation of the original diagnosis.

Cardinioides varidus Hayami, n. sp.

Pl. 12, Figs. 1-6.

Description:—Shell medium to large, equivalve, inequilateral, roundly subtrigonal, very inflated, much longer than high; test very thick; the greatest convexity lying near the center of valve; pre-umbonal margin short, slightly concave; post-umbonal one long, almost straight, forming an obtuse angle with posterior margin which in turn abruptly bents at the junction with ventral margin; ventral margin gently arcuate; umbo large, fairly protruded above hinge-margin, located anteriorly at the point of a third the length; posterior carina discernible only near umbo; lunule and escutcheon absent; ligament opisthodetic and external; pseudocardinal tooth on left valve large, trigonal, carved usually by two shallow grooves, though its shape is fairly irregular; two holes on its both sides flattened at bottoms, fitting to two teeth-like protuberances on the counter valve; posterior lateral tooth short, ridge-like, usually seen above posterior adductor scar, fitting to the opposite hollow on left valve;

anterior adductor scar small, strongly impressed, wedge-shaped; pedal retractor scar lying above it but often ill-defined; posterior adductor scar medium in size, and its anterior margin poorly impressed and, in consequence, pallial line appears sinuated posteriorly notwithstanding that it is entire; surface marked by somewhat coarse concentric lines of growth.

Measurement in mm:—

	Length	Height	Thickness	L/H
Holotype (MM 2637) Both valves	50.0	35.5	25.5	1.41
Paratype (MM 2638) Both valves	44.0	33.0	20.5	1.33
Paratype (MM 2639) Right internal mould	46.5	35.5	8.0	1.31
Paratype (MM 2640) Both internal moulds	44.0	30.5+	13.0	1.44−

Observation and comparison:—In this species the dentition and outline are fairly variable. Two right inner moulds (figs. 3b, 5a, 5b) clearly reveal posterior lateral teeth, but in another specimen (fig. 4) the lateral area is almost smooth. The holotype (figs. 1a–1d) has a weak posterior carina in the umbonal region, but in a paratype (figs. 2a–2c) it is seemingly absent.

This species is somewhat similar to *Cardinioides splendicus* Kobayashi and Ichikawa (1952) in general outline, but the posterior carina is much weaker and posterior extremity more rounded than in *splendicus*. The wide depression as seen from umbo to ventral margin in that species, is inobservable in this. Nothing is known of the interior of *splendicus*.

Cardinioides japonicus and *C. subtrigonalis* have similar pseudocardinals but no posterior lateral tooth and hollow. Their outlines are also fairly different and the umbo is situated more anteriorly in *japonicus* and more posteriorly in *subtrigonalis* than in this species.

Occurrence:—Common in black sandstones at Kuruma and Tsuchizawa in Kitaotari-mura, Nagano Pref. (Province of Shinano). Most of bivalved specimens are seemingly autochthonous in these sandstones.

Cardinioides ovatus Hayami, n. sp.

Pl. 12, Figs. 7–12.

Description:—Shell small to medium, equivalve, inequilateral, ovate to elliptical, non-carinated, well inflated, much longer than high; test thick; the greatest convexity lying near the center of valve; antero-dorsal margin short, sigmoidal; postero-dorsal one long, straight, turning gently to ventral side; ventral margin evenly arcuate; umbo protruded above hinge-margin, situated anteriorly at about two-sevenths of shell-length; lunule and escutcheon invisible or absent; pseudocardinal tooth on left valve somewhat irregular but usually trigonal, carved by a shallow vertical groove, fitting to non-carved pseudocardinal socket on right; two large sockets on the both sides of pseudocardinal fitting to teeth-like projections in right valve; anterior adductor scar small, strongly impressed, wedge shaped, while posterior one is large, circular and poorly impressed; pallial line probably entire, though sometimes it seems sinuated posteriorly due to weak impression of posterior adductor scar; surface marked by fine dense concentric lines of growth.

Measurement in mm:—

	Length	Height	Thickness	L/H
Holotype (MM 2643) Right valve	33.5	23.5	10.0	1.43
Paratype (MM 2644) Left internal mould	25.5+	22.0	7.5	?
Paratype (MM 2645) Right internal mould	36.0	29.0	7.5	1.24
(MM 2646) Right valve	29.0	23.0	10.0	1.26

Observation and comparison:—The non-carinated elliptical outline of this species reminds the writer of Diagenodonta or Teleodonta. But the presence of a pseudocardinal tooth and two hollows on its lateral sides in the left valve agrees with the dentition of *Cardinioides*. This species differs from the preceding and late Triassic species in the more elliptical outline, more sinuated antero-dorsal margin and absence of posterior carina. The posterior lateral tooth on the right valve is slightly stronger and more elongate than in *C. varidus*.

Occurrence:—Common in black mudstones of lower or middle Liassic Kitamatadani formation at Ohishi, Kotaki, in Itoigawa City, Niigata Pref. Two closely similar but fragmental specimens from the same formation at the mouth of Yogura-valley, Odokoro, in the same city.

Explanation of Plate 12

Cardinioides varidus HAYAMI, n. sp. ..... p. 70

Figs. 1a–1d. Bivalved specimen, Holotype (MM 2637) ×1; Loc. black fine sandstone at the middle stream of Tsuchizawa, Kitaotari village, Nagano Pref.

Figs. 2a–2c. Bivalved specimen, Paratype (MM 2638) ×1; Loc. black shale at Kuruma, the same village.

Figs. 3a–3b. Internal mould of a bivalved specimen, Paratype (MM 2640) ×1; Loc. ditto.

Fig. 4. Internal mould of a bivalved specimen, (MM 2641) ×1; Loc. grey coarse sandstone at the lower stream of Tsuchizawa, the same village.

Fig. 5a. Internal mould of a right valve, Paratype, (MM 2639) ×1; Loc. grey coarse sandstone at Kuruma, the same village.

Fig. 5b. Gypsum cast of the preceding specimen, ×1.

Fig. 6. Internal mould of a right valve, (MM 2642) ×1; Loc. coarse sandstone at the lower stream of Tsuchizawa, the same village.

Cardinioides ovatus HAYAMI, n. sp. ..... p. 71

Fig. 7. Right valve, Holotype (MM 2643) ×1; Loc. black mudstone at Ohishi, Kotaki, Itoigawa City, Niigata Pref.

Fig. 8. Internal mould of a right valve, Paratype (MM 2645) ×1; Loc. ditto.

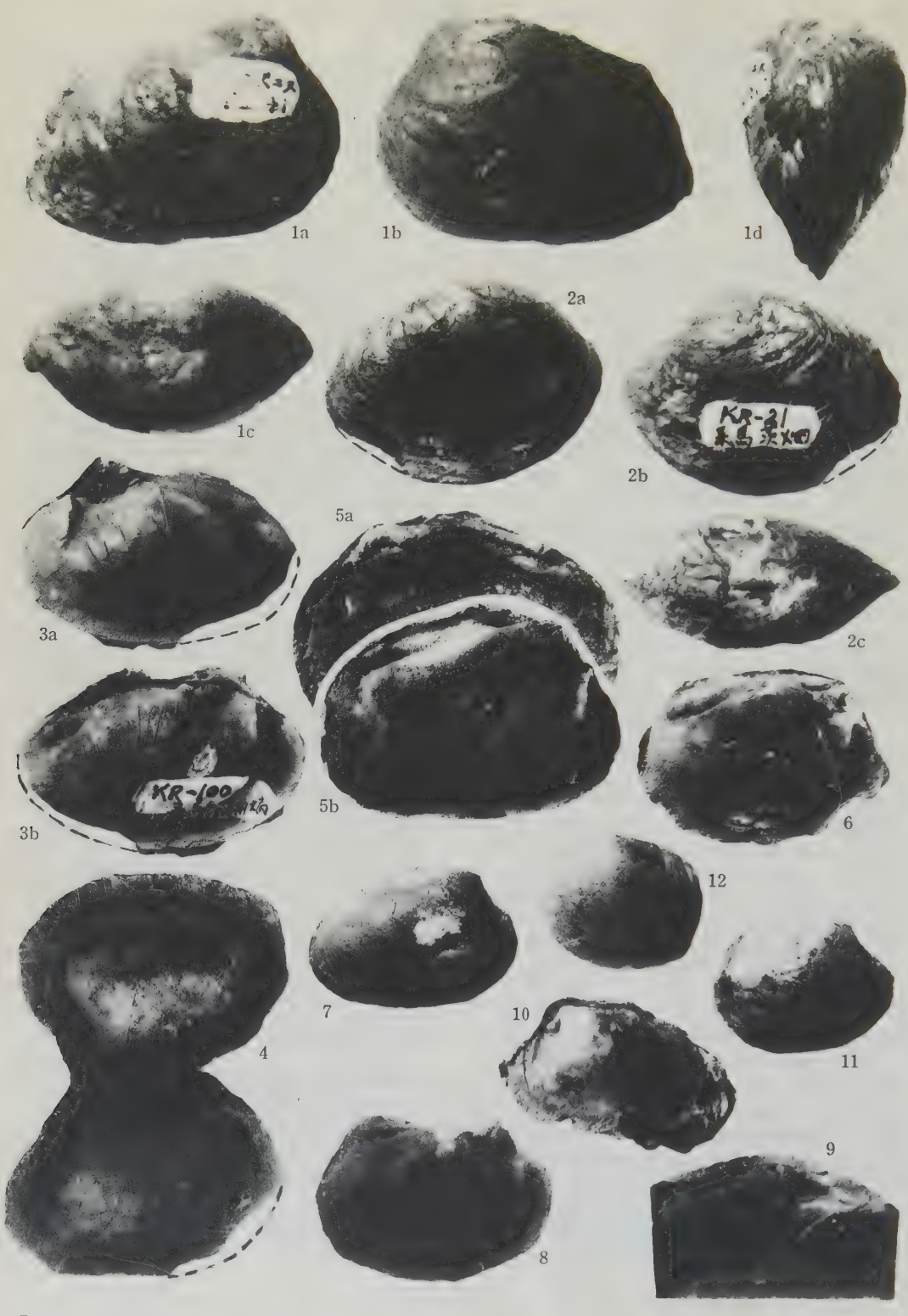
Fig. 9. Clay cast of the internal mould of a left valve, Paratype (MM 2647) ×2; Loc. ditto.

Fig. 10. Internal mould of a left valve, (MM 2648) ×1; Loc. ditto.

Fig. 11. Right valve, (MM 2646) ×1; Loc. ditto.

Fig. 12. Left valve, (MM 2649) ×1; Loc. ditto.

All specimens illustrated in this paper are kept in the Geological Institute of the University of Tokyo.

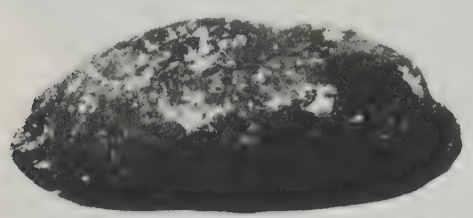


C. UEKI photo.

Cardinioides (?) sp. indet.

Text-fig. 1.

Two large specimens were obtained from the Iwamuro formation near the Iwamuro Power Plant in Akagine-mura, Gumma Pref. They are somewhat similar to *Cardinioides varidus* in the external features, but the specific identification is impossible, because of strong deformation and ignorance of internal structure. Specimen MM 2650.



Text-fig. 1. *Cardinioides* ? sp. indet. from Liassic Iwamuro formation. ×2/3

References

Agassiz, L. (1841), Études critiques sur les Mollusques fossiles.

Kobayashi, T. and Ichikawa, K. (1951), On *Palaeopharus*, a Late Triassic Pelecypod Genus. *Trans. Proc. Pal. Soc. Japan, N. S., No. 1.*

—— and —— (1952), The Triassic Fauna of the Heki Formation in the Province of Tamba, (Kyoto Prefecture), Japan. *Japan. Jour. Geol. Geogr., Vol. 22.*

Quenstedt, F. A. (1858), Der Jura.

Sato, T. (1955), Les Ammonités recueillies dans le groupe de Kuruma, Nord du Japon central. *Trans. Proc. Pal. Soc. Japan, N. S., No. 20.*

Waagen, L. (1907), Die Lamellibranchiaten der Pachycardientuffe der Seiser Alm. *Abhandl. Geol. Reichsanst., Bd. 18, Pt. 2.*

PROCEEDINGS OF THE PALAEONTOLOGICAL SOCIETY OF JAPAN

「日本古生物学会第65回例会」1956年12月1日九州大学理学部地質学教室に於いて開催した（参会者16名）。例会に於ける講演者並びに講演題目は次の通りである。

1. 三池炭田大牟田層群の微植物化石 ...高橋　清
2. 朝倉炭田古第三紀層からの花粉・胞子について .....高橋　清
3. Interesting Sand-pipes from the Miocene Toyoda Formation, Yamagata Prefecture, Japan. (代読)..... .....K. HATAI and Y. FUNAYAMA
4. 二畳紀紡錘虫 *Kahlerina* 類似の帝釈石灰岩産の一新種 .....勘米良亀齢
5. On the Classification of Lucinids in Japan, Part 1. (代読)..... ..... Katsumi HIRAYAMA
6. Tertiary Mollusca from the Uchiyama formation, Nagano Prefecture, Japan. (代読) .....Katsumi HIRAYAMA
7. Molluscan fauna from the Shimokurosawa Formation near Ichinoseki, Iwate Prefecture, Pt. 1. (代読) .....Shigeru AOKI and Shingo ONODERA
8. Miocene Mollusca from Southern Part of Shimokita Penins. (代読) ....Masae OOMORI and Shigeru AOKI
9. Some Molluscan Fossils from Moriya Formation, Central Sinano, Pt. 1. (代読) .....Kunio TANAKA
10. Notes on Molluscan Fauna from Toyooka Group in Boso Peninsula. (代読) .... Takaichiro OMORI
11. Preliminary Report on the Curvature of Tertiary Pelecypoda. (代読). Masae OMORI
12. On Some Fossil Echinoids of Japan, 1. (*Brissopsis* and *Eupatagus*). (代読) .... Akira MORISHITA
13. A Miocene Crab, *Charybdis yazakii*, n. sp. from the Tsuma Group of the Sourthern Part of Miyazaki, Kyushu. (代読)..... ..... Rikizo IMAIZUMI
14. A Miocene Crab, *Petalomera tsushimai*, n. sp. from the Chikubetsu Formation of Teshio Province, Hokkaido. (代読) ... . Rikizo IMAIZUMI

日本古生物学会例会通知

	開催地	開催日	講演申込〆切日
第67回例会	京都大学	1957年9月28日	1957年8月31日
第68回例会	九州大学	1957年11月30日	1957年11月10日

1957年6月10日 印刷
1957年6月15日 發行
定価 1部250圓
東京大學理學部地質學教室內
日本古生物學會
編集者 小林貞一
發行者 市川健雄
(振替口座東京84780番)
印刷者 東京都港區芝浦1丁目1
株式會社 ヘラルド社 富田元

購讀申込は下記の賣捌店へ申込下さい
東京都千代田區神田神保町1丁目7
大久保書店
電話東京(29)3306番
振替口座東京109140番

日本古生物学会報告紀事出版規定　(1957年2月9日年会にて改正)

I. 投稿規定

1. 原稿は日本古生物学会又は日本地質学会の総会講演会または例会において講演（代覧を認める）した後に，編集委員宛送付する。
2. 原稿は欧文に限り，タイプライター用紙 (22.5×27.5 cm) に1行おきに明瞭にタイプライトし，学名はイタリックに著者自身指定する。
3. 原稿（挿図・地図・附表を含む）は刷上り8頁（タイプライター用紙18枚以内）を限度とする。
4. 図版 (14.2×20.0 cm) は1枚まで掲載出来る。
5. 挿図 (6坪以下のもの2個・1坪は1寸平方) は白紙に墨または製図用黒インクにて明瞭に書き，図中の字はなるべく活字又はタイプライター字をはりつける。印刷に際して縮図することがあるから，線の太さ，字の大きさなどはこの点を充分に考えに入れて書く必要がある。
6. 地図には必ず縮尺をつける，縮尺何分の1としたものはいけない。
7. 以上の限度を超える場合は著者がその費用を負担する。
8. 原稿には邦文表題と簡単な邦文要約を附記する。
9. 引用文献はすべて文の最後に文献の項を設けてそこに一括する。文献は著者名のアルファベット順に配列し，同一著者の論文は発表年代順とする。著者名・発表年・論文表題・雑誌名・巻・頁・図版・挿図・地図・表等を正確に記入する。
10. 原稿には著者名の次に現在の所属機関名を附記する。
11. 別刷の必要部数を原稿に附記する。但し無表紙 50 部までは無償で，それ以上は著者がその費用を負担する。
12. 原稿は著者の責任において外人または適当と認められる人に見て貰う。

II. 編集規定

1. 編集委員は原稿の受理・保管・編集を行う。
2. 編集委員は原稿を受理した場合，その原稿が鮮明であり且つ其の他形式上の不備の無いことを確認した上で直ちに受理日附を記入し，著者には保管証を送る。
3. 原稿の採用・不採用は会長と常務委員との合議により決定する。
4. 編集委員は不採用原稿を不採用の理由を附記して著者に返却する。
5. 編集委員は採用原稿を出版費に応じて，受理日附の順に掲載する。
6. 著者が編集前に論文内容を訂正した場合には受理日附を変更する。
7. 印刷の体裁は大略 Journal of Paleontology の体裁に準ずる。
8. 校正は出版委員の責任においてこれを行う。